ELECTRICAL REVIEW

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Batteries and Accumulators.

Batteries for the purposes of general applications were very limited in number at the Exhibition of Munich. The most of those there exhibited were connected with electro-medical apparatuses.

We shall mention, however, the well known bichromate pile which goes with the Griscom's mover, the Fein's plunging pile, of Stuttgart, and the lime pile, Gardini's system, which was exhibited by the *Societie Industriale Franco-Italiana*, of Milan. This pile, the elements of which were contained in vessels of varnished tin, did not turn to be practical.

Several firms also exhibited Leclanché's elements, or parts of such elements.

Mr. Bendl had exhibited several kinds of carbons; the firm Gerzabeck & Co. exhibited carbons in plates and in prisms for Bunsen's, Leclanché's and Stoerer's plates. Dr. Lessing had exhibited Kipp's elements of manganese tablettes and also those of carbon and manganese cylinders; Mr. Miner, some crystallized and crushed manganese for the Leclanché's elements.

But if the piles, properly so called, did not present anything special, it was quite different with accessory piles or accumulators. The principal known types of those apparatuses were represented, and moreover, there were some others which had not appeared before.

Among the first we think proper to mention, first the accessory piles of Mr. Planté.

Mr. Planté had exhibited a group of apparatuses and designs which, so to say, formed the summary of his work.

It was first his isolated element, made of two plates of lead rolled together, with india rubber bands between them to keep them separate—Figs. 115 and 116—and plunged into a vessel full of acidulated water.

Two Bunsen's elements—Fig. 116—were sufficient to load that element and cover over one of its plates with peroxyd of lead, while the other remained in the state of metallic lead.

Mr. Planté used at first his isolated elements, and such as they were, he put them into a certain number of applications.

The model of Fig. 116, for example, had been disposed by him to demonstrate in his lectures the incandescence of a platina wire under the influence of the passage of a powerful current.

The two small Bunsen's elements, which, by themselves alone could not have produced such incandescence of the wire used, could produce the same for several minutes by the intermediary of the accessory piles.

The same type of elements is the one which, slightly modified subsequently, has become the base of Mr. Frouvé's polyoscope.

Another application made by Mr. Planté of his isolated couple was his *Briquet de Saturne*, the little lighter represented by Fig. 117.

A small mahogany box, bearing in front on its top a small alumin candle, over which a platina wire was stretched between two pincers. An accessory pile contained in the box is kept charged by the contact of its two upright supports, *C*, with a pile of three Danvill's elements. By pressing on a spring, *T*, the current will pass through the platina wire and the incandescence produced will light the candle.

If Planté's couple by itself gave the matter for sundry applications it was above all in the shape of a battery that it presented the greatest interest.

The first disposition used by Mr. Planté for that purpose is represented by Fig. 118. The couples, forty in number, were disposed in rectangular troughs. Each one of the lead plates touched by the end of its prolongation a small copper plate, the extremities of which carried springs and could be pressed down either by metallic rulers *MM'*, *NN'*, or by an insulating ruler, *BB'*, provided underneath with metallic parts. Those rulers were put together so as to form a frame, which could be moved to and fro in a rotary manner.

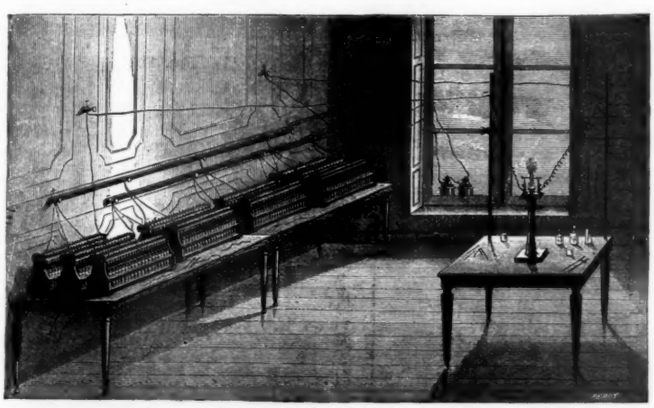


FIG 120.

In the position shown by Fig. 118 all the springs of the odd numbered plates were pressed down by the rod *MM'* and all the even numbered springs by rod *NN'*. The couples were then united in a quantity.

When the insulating rule was pressed down its metallic parts united all the springs in a tension, and in consequence thereof the corresponding couples.

That disposition was soon replaced by the one represented in the Fig. 119. The couples were disposed on two rows; above them was found a wooden rule bearing two rows of vertical springs, all the poles of the same name were connected with one of those rows, all the poles of contrary name with the other row. An insulating ruler, *CC'*, bearing on each side a metallic bar, connected all those springs in a quantity for the charge. When it was turned 90° it presented to the springs small pins connecting them two by two, and united the elements in a tension. A few hours was sufficient to obtain the charge of an apparatus already formed.

With such batteries Mr. Planté was able to produce by starting only from the charge of the two Bunsen's elements, effects which required a very powerful source of current. He could, for instance, produce for a few moments an electric arc light, bring a long platina wire into a state of incandescence, &c., but above all it was by uniting together, as it is shown by Fig. 120, several such batteries, so as to carry the number of elements up to 200, 400, 600 and 800, that he was able to produce remarkable effects and to study the peculiar phenomena due to high tension currents. His battery had moreover the advantage that while producing a high tension it had not a strong resistance.

Thus he could observe in a volta meter, with acidulated water and a platina wire, the kind of sheath which envelops the negative electrode when the current is powerful enough (40 accessory elements).

With 200 couples he was able to produce phenomena analogous to globular lightning.

In a volta-meter, with salt or acidulated water, if the positive electrode is plunged first and then the negative electrode be placed near to the surface sparks will be obtained at the end of it; but if the negative electrode be plunged first, then the positive electrode will give a luminous globula of vaporized matter, which will soon get animated by gyration and take a flattened shape. The phenomenon is accompanied by a rattling noise, which seems to proceed from successive condensations of the matter.

With distilled water and 800 couples, the positive electrode being plunged first, the negative will produce a yellow flame, which by a little larger deviation will get transformed into a globulous ovoid. The sparks then produced on the surface will give place to various effects.

Another experiment, which yet comes nearer to globular lightning, as it is observed in nature, can also be realized with the 800 couples, by using the same to charge a mica condenser. If the mica plate should happen to be weak at some point, then it will at such point get perforated as a bottle of Leyde overcharged would do, and the spark will continue in the shape of a globula furrowing the plate by the melting of the tin.

When, with the salt or the acidulated water volta-meter, a battery of 400 couples be used instead of one of 200 couples, the phenomenon changes, and in the place of one globula we get a sheaf of globulas. The phenomenon will also be produced if the end of the positive wire be wrapped with filtering paper saturated with salt water. But when the mass of salt water in the volta-meter becomes very weak, it gets heated, and the globulas give place to an emission of vapor. —*La Lumière Electrique.*

Sound Vibrations Photographed.

PICTURES IN ONE TWENTY-FOUR THOUSANDTH OF A SECOND.

Photography appears to be running a race with electricity in curious developments and novel applications. George G. Rockwood, the well-known photographer, has just achieved the remarkable feat of photographing sound waves instantaneously. The instrument by which the sound wave was represented or made visible in its effect is a new telephone, the inventor of which has obtained from Mr. Rockwood a perfect ocular demonstration of its vocal repeating action. The vibrating diaphragm, upon which the voice is projected, has a fine metallic point mounted on the center of its reverse side. This point meets the pointed end of a conducting wire so nearly that when at rest the interval between the two points can be discovered only through a strong lens. The thing to be done was to show in a picture of the instrument, or rather in a series of pictures, the alternate contact and separation of the points from the vibrations imparted to the diaphragm by the voice, involving the closing and opening of the electrical circuit and the consequent reproduction of the same rate of vibration in the receiving instrument at the other end of the line. In considering this problem Mr. Rockwood found himself indebted to his recollection of an experiment by Herschel in photographing (or daguerreotyping) with the electric spark. Herschel caused a four-sided prism of wood, around which a picture was pasted, to revolve at high speed as in a turning lathe. By illuminating this revolving picture with the electric spark (in total darkness otherwise) he obtained a photograph of it as standing still at that instant in its revolution when the spark flashed. In describing his experiment Mr. Rockwood said :

"Wheatstone measured the duration of the electric spark as one-twenty-four thousandth of a second. It would follow that any vibration not quicker than this might be arrested on the photographic plate at any point in its travel. Whereas, according to the investigations of Plateau, the duration of successive impressions on the human eye will average half a second, the electric spark might separate and distinguish photographically waves of which 12,000 impinge on the retina while the first of them is still lingering there; in other words, 12,000 practically all at once. Now the vibrations or waves of air that yield the respective tones or pitches of sound have been accurately measured and counted. Assuming the

pitch of the ordinary masculine voice in conversation to be as low as middle C, the number of complete double vibrations imparted by such a voice to the telephonic diaphragm or tympanum would be 256 per second; that is counting both ways, 512 movements of the diaphragm with its metallic point making or breaking the electrical circuit at each movement. To the eye, which retains every impression for half a second, 256 of these movements would make their impression as one, and would give a stationary, fictitious image, if they were of sufficient depth to produce any visible effect whatever, as they are not. The electric spark, however, would give its illumination and do its photographic work within a little more than one-fiftieth of the time of one of the tympanum movements. A succession of such photographs, therefore, would present fortuitously any position of the vibrating point from that of contact to that of extreme retraction, with an indefinite number of intermediate positions."

To verify these calculations, Mr. Rockwood carefully focussed his photographic camera on the points of the telephone by daylight, and a battery of Leyden jars was so adjusted that when discharged it would throw the proper illumination on the points. Mr. Rockwood's instantaneous plates were now to be tested under action five hundred times quicker than a sensible instant and also invisibly minute. Of course it was as yet a practical question whether they could effectively receive as quickly as the electric spark would give this infinitesimal action of light. Waiting until the darkest hour of the night, the plate was uncovered in total darkness, the telephonist began speaking into his instrument, and the illuminating spark was flashed upon the points. This operation was repeated with more than twenty plates in succession. The resulting negatives, on being developed, proved a triumph in two arts and a science. The photographs printed from them showed under the glass, in some, contact of the points and in others a variety of infinitesimally differenced intervals between them. Not one of the impressions had more than the one twenty-four thousandth of a second in which to be begun and ended.

A Large Electro-Plating Machine.

Mr. A. H. Eddy, of Hartford, Ct., manufacturer of dynamo machines, is constructing at Colt's armory an enormous battery, to be used for copper coating the wires to be used by the Postal Telegraph Company. The machine will cost $12,000. The steel wire is being manufactured at Ansonia.

Suggestions for Facilitating the Use of a Delicate Balance.

By Lord Rayleigh.

[Paper read before the British Association, at Southport, England, September, 1883.]

In some experiments with which I have lately been occupied a coil of insulated wire, traversed by an electric current, was suspended in the balance, and it was a matter of necessity to be able quickly to check the oscillation of the beam, so as to bring the coil into a standard position corresponding to the zero of the pointer. A very simple addition to the apparatus allowed this to be done. The current from a Leclanché cell is led into an auxiliary coil of wire, coaxial with the other, and is controlled by a key. When the contact is made a vertical force acts upon the suspended coil, but ceases as soon as the contact is broken. After a little practice the beam may be brought to rest at zero at the first or second application of the retarding force.

This control over the oscillations has been found so convenient that I have applied a similar contrivance in the case of ordinary weighing, and my object in the present note is to induce chemists and others experienced in such operations to give it a trial. Two magnets of steel wire, three or four inches long, are attached vertically to the scale pans, and underneath one of them is fixed a coil of insulated wire of perhaps 50 or 100 turns, and of four or five inches in diameter. The best place for the coil is immediately underneath the bottom of the balance case. It is then pretty near the lower pole of the magnet, and is yet out of the way. The circuit is completed through a Leclanché cell and a common spring contact key, placed in any convenient position. The only precaution required is not to bring other magnets into the neighborhood of the balance, or at any rate not to move them during a set of weighings.

The other point as to which I wish to make a suggestion relates to the time of vibration of the beam. I think that with the view of obtaining a high degree of sensitiveness, the vibrations are often made too slow. Now, the limit of accuracy depends more upon the smallness of the force which can be relied upon to displace the beam in a definite manner than upon the displacement so produced. As in other instruments whose operations depend upon similar principles, *e.g.*, galvanometers, it is useless to endeavor to increase the sensitiveness by too near an approach to instability, because the effect of casual disturbances is augmented in the same proportion as that of the forces to be estimated. If the time of vibration be halved, the displacement due to a small excess of weight is, indeed, reduced in the ratio of four to one, but it is not necessarily rendered any more uncertain. The mere diminution in the amount of displacement may be compensated by lengthening the pointer, or by optical magnification of its motions. By the method of minor reading such magnification may be pushed to almost any extent, but I am dealing at present only with arrangements adopted for ordinary use.

In the balance (by Oertling) I am now using the scale divisions are finer than usual, and the motion of the pointer is magnified four or five times without the slighest inconvenience by a lens fixed in the proper position. The pointer being in the same plane as the scale divisions, there is no sensible parallax. In this way the advantage of quick vibrations is continued with easy visibility of the motion due to the smallest weights appreciable by the balance.

To illuminate the scale the image of a small and distant gas flame is thrown upon it by means of a large plane plain lens. This artificial illumination is found to be very convenient, as the instrument stands at some distance from a window, but it is not at all called for, in consequence of the use of a magnifying lens.

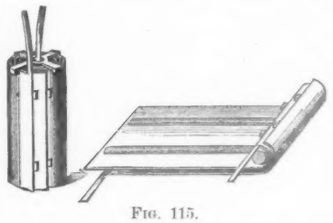


Fig. 115.

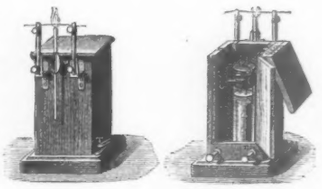


Fig. 117.

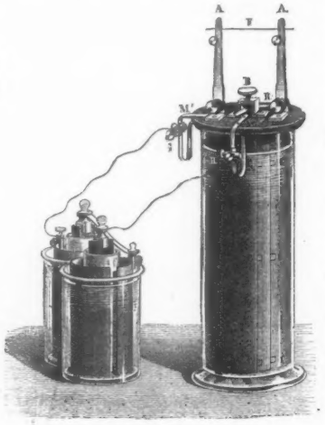


Fig. 116.

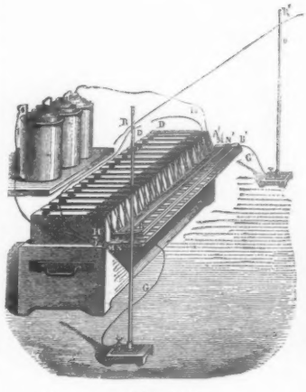


Fig. 118.

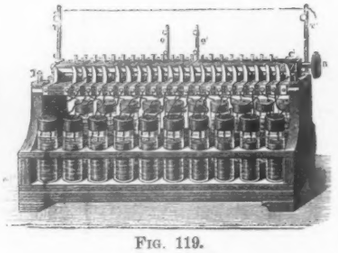


Fig. 119.

The Franklin Institute of the State of Pennsylvania for the Promotion of the Mechanic Arts.—*International Electrical Exhibition in Philadelphia, To Open Tuesday, Sept. 2d*, 1884.—The attention of all persons interested in the generation and application of electricity is respectfully invited to the exhibition of electricity and electrical appliances to be held in Philadelphia, United States of America, commencing on Tuesday, September 2d, 1884, under the auspices of the Franklin Institute of the State of Pennsylvania for the Promotion of Mechanic Arts.

From the eminent reputation of this institution, coupled with the fact that the projected exhibition will be the first in America exclusively devoted to this important and progressing branch of science, the above announcement has attracted unusual interest throughout the United States, and the exhibition will undoubtedly afford an admirable opportunity of witnessing a representative display of American discovery and invention in electricity.

To increase its scientific and industrial importance, as well as to add to its attractiveness, it was determined shortly after its inception to give it an international character. The importance of the project having been properly represented to the Congress of the United States, an act was passed which, having received the signature of the President of the United States, is now the law.

This official recognition provides for the admission into the United States, duty free, of all articles for exhibition only. The text of this act of Congress is as follows:

"Whereas, the Franklin Institute of the State of Pennsylvania for the Promotion of the Mechanic Arts proposes to hold an exhibition of electrical apparatus, machinery, tools and implements, and other articles used in scientific and mechanical and manufacturing business and investigations; and

"Whereas, it is deemed desirable to promote the success of such an exhibition by all reasonable encouragement, in order that it may be made useful for the promotion of knowledge; therefore, be it

"Resolved, by the Senate and House of Representatives of the United States of America, in Congress assembled, that all articles that shall be imported for the sole purpose of exhibition at the exhibition to be held by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, in the city of Philadelphia, in the years 1883 or 1884, shall be admitted without payment of duty or customs fees or charges, under such regulations as the Secretary of the Treasury shall prescribe; *provided*, that all such articles as shall be sold in the United States, or withdrawn for consumption therein at any time after such importation, shall be subject to the duties, if any, imposed on like articles by the revenue laws in force at the date of importation; *and provided, further*, that in case any article imported under the provisions of this joint resolution shall be withdrawn for consumption, or shall be sold without payment of duty as required by law, all the penalties prescribed by the revenue laws shall be applied and enforced against such articles, and against the persons who may be guilty of such withdrawals or sales."

It remains only to add, at the present time, that no effort will be spared by the Franklin Institute to secure a large and important representation of the progress of foreign countries, and that the most liberal provisions will be made to place European and American exhibitors on a fair and equal footing.

The subject of electricity and its applications is at present attracting an unusual amount of attention, and the exhibition side by side of the best achievements of Europe and America cannot fail to be in the highest degree instructive.

All information required by exhibitors, including the classification of exhibits, regulations for the entry of articles for competition, advices as to the best modes of transportation, custom-house regulations, and all other needful information, will be furnished to parties making application for space for exhibition.

Such applications should be made to the Secretary, Franklin Institute, Philadelphia, U. S. A.

For the Franklin Institute: William P. Tatham, President; William H. Wahl, Secretary.

The Electric Light in Theaters.

Professor Max Pettenkoffer has recently given in the *Wiener Medizinische Presse* a detailed opinion of the electric light in theatres, in which he draws the following conclusions:

1. The electric light hinders, to a great extent, the overheating of the air in the theater.

2. Of course it does not render ventilation of the theater superfluous, but affords in itself a more thorough means of ventilation than gaslights, which contaminate the air of the room by the heat and products of combustion, both of which are avoided by using the electric light.

The Varley Patent Accumulator.

This accumulator consists of elements made of lengths of cotton driving band or other woven fibrous material. These are generally rolled in volute form, and put through the same processes as in the case of the carbon candle, the area of surface thus presented by the carbonized fibres is enormous. "The cells of the accumulators are charged with a saturated solution of two parts of sulphate of zinc, and one part of sul-

phate of manganese, with a small quantity of sulphate of mercury to prevent local action on the deposited zinc. In charging the storage battery, metallic zinc is deposited on one carbon pole, and binoxide of manganese in electrical continuity on the other; the latter, when in use, becomes the hydrogen absorbing pole, whilst the former absorbs the oxygen; in fact, a zinc and carbon battery is formed, with increased potential." The zinc and the liquid being the only elements of a heavy character, the smallness of weight in comparison to the lead accumulators must be apparent, and as a thousand square feet of accumulative surface can easily be given in one continuous plate in coil form, its smallness of bulk, as well as immense storage capacity, must be equally obvious.

Why Electric Light is Healthier.

We have some very interesting figures before us comparing the different modes of illumination in respect to the amount of products of combustion:

Light of 100 Candles.	Products per Hour.		
	Water Vapor, Kilos.	C'rbonic Acid in Cubic Meters.	Heat in Calories.
Electric lamp, arc	0	0	57–15
Electric lamp, incandescent....	0	0	290–536
Gas, Argand burner.....	086	046	4860
Lamp, petroleum, flat flame	080	095	7800
Lamp, colza oil .	085	100	6200
Candles, paraffin.	099	122	9200
Candles, tallow..	005	145	9700

These, we think, are quite sufficient to show the great supremacy of electric lighting over all other methods of illumination when considered as a matter of health, because it produces less carbonic acid, while the smaller amount of heat shows less waste in making light.

Electricity Not a Form of Magnetism.

Professor Hughes has recently advanced views about magnetism which, if accepted, will largely modify the position which science assigns to this property. He asserts that where there is no apparent magnetism, or the magnetism is neutral, there is not, as had been supposed, an indifferent turning of the molecules in all directions, with consequent balancing of influence, but, on the contrary, there is a perfect symmetrical arrangement, the molecules (or their polarities arranging themselves so as to satisfy their mutual attraction by the shortest path, and thus form a complete closed circuit of attraction. When magnetism becomes evident, the molecules (or their polarities) have all rotated symmetrically in a given direction, but the symmetery of arrangement is such that the circles of attraction are not completed except through an external armature joining both poles. Again, he shows that we have permanent magnetism when the molecular rigidity retains the molecules of their polarities in a given direction, and transient magnetism whenever the molecules are comparatively free. Professor Hughes also shows that the inherent polarity or magnetism of each molecule is, like gravity, a constant quantity which can neither be generated, nor augmented, nor diminished, nor destroyed. Neither can magnetism be changed to any other form of force or property of matter. It must be, therefore, dissociated from electricity, as certainly as gravitation must be dissociated from heat and light. Electricity may be generated by magnetism just as light and heat (as is the case of the sun) may be generated by gravitation; but electricity is not a form of magnetism, any more than heat or light is a form of gravity. —*Contemporary Review.*

Edison invented a talking machine. None are selling. No one needs it. An idea! Let him invent a thinking machine. Thousands are in demand.

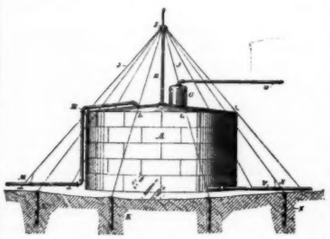
Protection of Oil Tanks from Lightning.

Explosions and large fires, involving a great loss, have become quite frequent in this country, owing to the lightning discharges taking place in line with the large iron tanks used for the storage of petroleum.

These tanks are constructed of heavy iron, riveted together and made fluid tight in the usual boiler fashion. Together with their supply and delivery pipes and their contents, which vary from 250,000 to 1,000,000 gallons of oil, they become highly electrified during a thunderstorm by the induction of the electrified clouds overhead, and are frequently selected as the path for the uniting of the electricities of the clouds and the earth.

The iron tank heated by the sun's rays aids in the formation of a highly inflammable gas which escapes at the top of the tank into the air, and is readily ignited by the electricity in its passage to or from the tank, thereby giving rise to an explosion and large fire.

In the accompanying illustration is shown a novel and ingenious plan devised and recently patented by Mr. H. W. Spang, of Reading, Pa., for the protection of an oil tank from lightning. It consists in inclosing the tank, *A*, in a radial or diffusive system of metallic conductors, *J*, radiating from a ring or plate, *I*, which is fastened to iron rod, *H*, which rests upon the top of tank, and is fastened thereto. The said conductors, *J*, are



electrically connected with perforated iron pipes or other suitable earth terminals, *K*, also with the supply and delivery pipes, *E* and *F*, at *M* and *N*, and with the tank, *A*, at *L*, thereby effectually preventing electric arcs being formed between the tank, supply and delivery pipes and the said radial system of conductors, a feature that has heretofore been overlooked by every other inventor.

Upon the upper portion of the tank, *A*, is placed a dome, *G*, for collecting the gas which forms in the tank. A tube or pipe, *O*, leads from this dome to a distance from the tank and serves to conduct the gas away from the tank and the path of the electrical discharge, to a suitable and safe distance therefrom. The tube *o*, is of non-conducting material and therefore cannot, under any circumstances, convey electricity to or from the tank. In this manner the ignition of the gas in the immediate vicinity of the tank, which is the chief danger experienced in a thunderstorm, is effectually prevented.

Statical Electricity.

In the *Ann. Chem. Phys.*, 2nd series, Vol. XIX., pp. 325-340, will be found a paper by V. Dvorak, an abstract of which appears in the *Journal* of the Chemical Society for August. The author has made a series of observations on the electric discharge of Leydén batteries consisting of glass plates between thin layers of silver The form of this charge is dependent not only on the thickness of the silver layer, but also on the intensity of the charge and the distance of the electrodes. The first part of the discharge consists of a large number of sharply-defined ripples, disposed concentrically around the electrode; the second portion consists of thin branches containing only traces of silver; and in the third portion, which is colorless and transparent, silver is wholly absent. If the silver be coated by a layer of some insulating material, as varnish or oil, the ripples are generally absent, and the radiating branches diverge immediately from the electrodes; the color of the discharge is golden or even brown. If the varnish layer be made too thick the glass plate is frequently shattered by the discharge. On substituting thin layers of graphite for the silver, the discharge took a different form, the ripples were perpendicular to the direction of the discharge. Layers of a mixture of pulverulent conductor, as finely divided graphite, with stearic acid, give a discharge, the form of which the author compares to a series of needles inserted in the positive poles; olive oil, turpentine, gave similar discharges. The author, on examination, considers Riess's theory as regards the electric action of flames untenable. According to Riess, two different cases of electrostatic action of flames must be distinguished—first, of substances which only glimmer as carbon; secondly, of inflammable substances, which form a conducting column of hot gas. In the first case, the electrostatic action will arise from a series of solid points, but in the second case from a series of gaseous points. The author quotes experiments to demonstrate that in the first case the action is derived from a series of gaseous points in a heated column. He further proves that the electric repulsions, normal to the surface of a gaseous column, scatter the electrified particles in all directions, so that the whole environment of the flame is filled with electrified particles. This fact offers an explanation of the well-known phenomena of the removal of electricity from an electrified body and the charge of a conductor by means of a flame.

A New Semi-Incandescent Lamp.

M. P. Tihon has shown to the Industrial Society of Lyons an electric lamp having the intensity of the voltaic arc and the steadiness of the incandescent lamp. The inventor describes his lamp as follows: The voltaic arc is usually produced in a gaseous medium (air), constantly heated by it and constantly renewed—a cause of resistance and unsteadiness If the carbons of a lamp were kept in contact the resistance would be greatly diminished, the arc would no longer be produced, and the light would be absolutely steady but very weak. This decrease in the light is to be attributed to the decrease in the resistance—that is, to the suppression of the arc. We must, therefore, keep the arc to obtain intensity, but we must also fix it by offering it a solid pathway from one carbon to the other instead of abandoning it to the medium of the air. By thus putting the question before me, adds M. Tihon, I was led to cause two carbons to abut on a rod of refractory matter which, becoming a conductor at the point where it is licked by the arc, offers an easy pathway to the latter, from which it will never seek to turn. To put this idea into practice, I first of all cut from a small block of chalk a little prism, the section of which is such that one side represents a small rod 5mm. wide, and projecting 2mm. This prism is placed vertically, and the upper parts of two carbons of equal length, and slightly inclined, are made to abut on it so that they remain separated by the small projecting rod. When the two carbons are connected to the two wires from an electrical machine and a current is passed it jumps across between the two points, first of all traversing the small projection; this is at once heated to the same temperature as that of the arc itself, and thereby acquires a certain conductivity which, if need be, will maintain the arc, supposing that from one cause or another the current should fail to any extent, thus avoiding any extinction of the light. But this is not the only advantage; the incandescent chalk rod itself gives out a light at least equal to that of the arc. Now, this incandescence will not vary as quickly as the current which feeds the lamps, so that playing the part of a fly-wheel in a steam engine the chalk rod first absorbs the heat of the arc, transforms it into light by its incandescence, and distributes it with the same regularity that a sifter lets flour pass. We should add that these lamps do not cost more than 5fr.—*Les Mondes.*

The International Exhibition of Nice is to number among its attractions a submarine chamber lighted by electricity and connected with the surface by a telephone. This diving bell will accommodate a number of persons, and as the sea is dark at the depth of seventy meters, the electric light will be used to illuminate the sea bottom to which the chamber will be lowered.

The Kabath Accumulator.

The following table has been given by our contemporary, the *Révue Industrielle*, showing the capacity of the Kabath accumulator at various periods of formation, from 75 hours up to 4,000:

Number of hours of formation.	Capacity per kilogram of lead.		Weight of lead per horse-power in kilograms.	Energy stored in an accumulator.	
	Kilogrammetres.	Coulombs.		Kilogrammeters.	Horse-power hour.
75	750	5.000	360	15.750	0.058
100	850	5.500	317	17.850	0.065
150	1.000	6.250	270	21.000	0.078
200	1.200	7.350	225	25.200	0.093
300	1.500	9.050	180	31 500	0 116
400	1.750	10.500	154	36 750	0.135
500	2.000	12 000	135	42.000	0.155
600	2.250	13.500	120	47.250	0 175
700	2.500	15.100	105	52 500	0.194
800	2.750	16.400	98	57.750	0.213
900	3.000	17.500	90	63.000	0.233
1.000	3.250	19.000	83	88.250	0.253
1.200	3.750	22.000	72	78.750	0.292
1.400	4.250	25.000	61	89.250	0.330
1.600	4.750	28.000	57	99.750	0.369
1.800	5.250	31.000	51	110.250	0.408
2.000	5 750	34.000	47	120.750	0.447
2.200	6.250	37.000	43	131.250	0.486
2.400	6.750	40.000	40	141 750	0.525
2.600	7.250	43 000	37	152.250	0.564
2 800	7.750	46.000	34,8	162.750	0.603
3.000	8.250	49.000	32,8	172.250	0.642
3 200	8.750	52.000	31	183 750	0.680
3.400	9 250	55.000	29,2	194.250	0 719
3.600	9.750	58.000	27.6	204.750	0.758
3.800	10.250	61 000	26	215.250	0.797
4.000	10.750	64.000	25	222.750	0 836

To convert kilogrammeters into foot-pounds it is necessary to multiply by 7.2; and to convert a kilogram into a pound, multiply by 2.2.

The Varley-Shearer Electric Meter.

The construction of this meter is remarkable for simplicity. It has long been known that a certain amount of current would transfer electrolytically a certain amount of metal from one electrode to another, and several attempts have been made to get a meter founded on this action of the electric current. A notable case is that of the Edison meter. But it never before seems to have occurred to any inventor to combine with this the principle of the hydrometer, which may be regarded as the basis of this patent. The quantity meter is in fact an hydrometer having an electrode below the bulb and another attached to the cell graduated to record on the flotation line, in rising and falling, as the case may be, the amount of current that has passed. If, for instance, for three months the metal has been charged on the bulb electrode, the hydrometer will have sunk in proportion; then if the current be reversed during the next three months, the rising scale will indicate the electrical equivalent of the amount of metal discharged from the bulb. Of course, as seen in use, there is a dial-plate indicating in tens, hundreds, &c., the amount of current that has passed and various other forms of record, but the hydrometer is the motive power of all forms of recording mechanism.

From statistics recently published by a German house, it seems that there are 3,985 paper mills in the world, producing every year 959,000 tons of clean paper. About one-half is printed on and the other half is used for writing paper. Annually the various Government departments consume about 100,000 tons in official business, the schools 90,000 tons, commerce 120,000 tons, industry 90,000 tons, and private correspondence in all only 90,000 tons.

Tests of Incandescence Electric Lamps.

Our esteemed contemporary, *La Lumière Electrique*, publishes the following tables, giving the results of the tests made on various incandescence electric lamps, at the recent exhibition held in Munich, as compared with those of the Paris Exhibition of 1881. A peculiarity in the Cruto lamp is that its resistance *increases* with the current strength, an effect which certainly cannot be beneficial to the economical working of the lamp.

RESULTS OF THE MUNICH COMMITTEE.

Lamps.	Mean spherical luminous intensity in normal candles.	Resistance when hot in ohms.	Difference of potential in volts.	Current in amperes.	Electrical Work in		Mean spherical intensity per H. P.	Number of Lamps per H. P.
					Volt amperes.	H. P.		
Edison B.....	11.69	67.68	55.78	0.825	46.02	0.0625	186.90	23.36 (8 candles)
" A.....	15.32	139.60	103.05	0.755	77 80	0 1057	144.88	9.05 (16 ")
Maxim	13.34	47.01	65.07	1 384	90.06	0.1224	108.98	3 89 (28 ")
Swan A.....	10.95	31 91	38.38	1 222	46.90	0 0637	171 78	17.18 (10 ")
" B.....	37.17	87.03	118.02	1.282	151.30	0.2056	180.75	4.52 (40 ")
Siemens	14.90	104.72	95.74	0.915	87.60	0 1191	125.14	7.82 (16 ")
Muller A.....	18.43	58.62	74.04	1.263	93.51	0.1271	145.01	7.26 (20 ")
" B.....	43.08	59.52	105.22	1.779	187.19	0.2544	169.33	3.39 (50 ")
" C..... ...	102 35	65.41	155.15	2.367	367.24	0.4991	205 05	2.05 (100 ")
Cruto.....	8 47	8 16	22.15	2.715	60 13	0.0817	103.58	10.36 (10 ")

RESULTS OF THE COMMITTEE OF THE EXHIBITION OF 1881.

Edison A.....	15.38	137.4	89.11	0.6510	57.98	0.0788	196.4	12 28 (16 candles)
" C.....	31.11	130.03	98.39	0.7585	74.62	0.0941	307.25	9.60 (32 ")
Swan A.....	16.61	32 78	47.30	1.471	69.24	0 0945	177.92	11.12 (16 ")
" B.....	33.21	31.75	54.21	1.758	94.88	0 1059	262.49	8.20 (32 ")
Lane-Fox A.....	16.36	27.40	43.63	1.593	69.53	0.1025	173.58	10.85 (16 ")
" B.....	32.71	26.59	48.22	1.815	87.65	0.1289	276.89	8.65 (32 ")
Maxim A	15.96	41.11	56.49	1.380	70.85	0.1191	151.27	9.45 (16 ")
" B.....	31.93	39.60	62.27	1 578	98.41	0.1357	239.41	7.48 (32 ")

Storage of Electricity.

Professor A. K. Eaton, an attache of William Wallace & Sons' manufactory in Ansonia, has invented a storage electrical battery which is claimed to be a great improvement over any previous device of the sort ever produced. His storage battery is the result of experiments extending over a number of years. It consists of a wooden box, two or three feet square, filled with acid and water and containing two plates, one of them peroxide of lead and the other sponge lead, the two forming the positive and negative poles of a battery which, on being charged by an electro-dynamo machine, retain the electricity thus imparted, the peroxide of lead going over to the sponge lead until the latter is peroxized and the receptive capacity of the latter is exhausted. By means of Professor Eaton's invention it is claimed that electricity generated by power at any distance from the storage batteries can be utilized and held for any use to which it is desired to be put.

Magnetism and Watches.

OR HOW TO CURE A WATCH AFFECTED BY THE MAGNETISM EMANATING FROM AN ELECTRIC GENERATOR.

Editor Electrical Review:

Having read a communication in the current number of your journal on the subject of the magnetization of watches, and the great liability to such injury, I think it will not be inopportune for me to narrate some recent experience for the benefit of the constantly-increasing number whose business brings them in frequent proximity to powerful magnets, such as those forming the basis of the electric generators of the present day, which will enable any one, without special experience, to quickly restore a useless watch to its original condition of reliability.

During a visit to the Van Dopoele Electric Light Factory at Chicago, in the course of experimental investigation, I was brought frequently into the vicinity of a 60 arc light dynamo, the largest of its kind successfully operated anywhere, and the consequence was that my watch, a reliable American movement, began to run slow from five to ten minutes per day. I was advised to send it back to the factory to have all the steel parts replaced, but concluded to first try the following simple experiment: I suspended the watch from my finger by means of a stout thread or light twine about two feet long. I then untwisted the thread until there were a great number of revolutions stored in it. I then held the watch (by means of the thread) about a foot from one of the magnets of the above mentioned machine. The tendency was for the watch to stand still, but by moving it slowly further away from the magnet it begun to rotate upon its own axis, and continued to do so until the thread was entirely unwound. I had continued to move it away from the machine during the entire time of its rotation, and when it stopped it was about clear of the magnetic field. I then returned it to my pocket, and it has given entire satisfaction ever since, running as well as before. I am not the *first* discoverer of the foregoing, or you may be sure I would try hard to get myself a patent for it, but the explanation is very simple, and is that by rapidly and often exposing different sides of the steel to the action of the magnetic forces, poles are formed everywhere, which eventually neutralize each other, or, in other words, the molecules become disarranged, and the metal becomes, so to speak, *crazy*, in which condition it cannot ever again be made into a powerful magnet. Electricians having magnetic material in the above condition find it necessary to heat it red-hot, and allow it to cool before being able to utilize it.

My own watch having been cured so easily, I hope the gentleman with the expensive chronometer will be notified that a remedy exists for the damage heretofore done to it.

Yours very truly,

FRANKLAND JANNUS.

Washington, D. C., Oct. 15, 1883.

Telephone Interests in Springfield, Mass.

The rapid growth of the telephone business in Springfield, Mass., has been quite remarkable. A very few years ago the idea that conversation could be easily and distinctly carried on not only from one point in the city to another, but from this city to towns and cities miles away, would have been scouted. The first real practical illustration of what the telephone might be made to accomplish was given at the City Hall some five years ago. The hall was filled, and two or three little boxes were suspended from wires at different points. Then the audience waited patiently to hear something. The sound came at last from voices singing in another building not far away, and everybody applauded. Music could also be heard from Westfield, but when it came to hearing anything from Pittsfield only a very few persons could do so, though every one tried his level best to catch the sound. The audience was much pleased, and decided that perhaps the telephone might do for short distances, but as to putting it into practical use for talking from one town to another that was quite another thing. Not long after the gas company's office, at the corner of Main and State streets, was connected by telephone with its works, and J. H. Banks & Son had a similar arrangement between their office and yards. The late George Dwight took much pleasure in allowing his friends to talk from the gas company's office, and for a long time people visited the place for that purpose. In 1879, W. J. and Henry Denver, of the Western Union Telegraph Company, started out in behalf of that company to form a telephone company, and soon had secured the names of a number of well-known citizens. An office was opened on Pynchon street, under the Opera House, and Frank G. Daboll was installed as operator. The first instrument was put in at the Springfield Club House, and was at once put into active use by people who wanted to try it and experience the then novel sensation of carrying on a conversation with some one they could not see. As soon as the practical benefits of the telephone became apparent the instruments were in demand, and another company began business over the Second National Bank, selling out to the old company, however, after running for some time. The business increasing, Miss Mary O. White was secured as an operator shortly after the office was opened, and about a month later Miss Lizzie A. Lane was added to the force. E. B. Baker became manager, the force of the operators was further increased, and the demand for telephones grew steadily. The name of the company was the Springfield Telephone Company, but it has since been changed to the Hampden, and later to the Bay State. Mr. Baker resigned and Mr. Daboll was given the position of manager, which he filled ably and well until last October, when he was made division superintendent, taking under his charge the offices of this city, Holyoke, Northampton, Westfield and Palmer, with their tributaries, and being succeeded as manager by Guy Carleton, who has had much practical experience as an operator and in the general work of the business. In 1881 there were four young women operators employed, and in April of that year the office, which had greatly outgrown its quarters, was removed to its present location in Kinsman's Block. A very rapid increase in the business has resulted, and it is still growing. The force of the office now consists of Miss Mary O. White, the chief operator, and Misses Ella Bricknall, Annie A. White, Maria Seguin, Fannie Rhem, Mary Rhem, Miss Lizzie A. Lane as trunk line operator. The office is never closed. The young women begin work at 7.30 A.M, and work regularly on week days until 6 P. M. The young women take turns at working until 9 P. M., so that three operators are on duty every evening, and for this extra labor each is allowed three hours out on one afternoon of each week. The night operator, Geo. H. Whipple, goes on at 6 P. M. and remains until 7 A. M. From 10 P.M. to 6 A. M. he is required to punch a night clock every 15 minutes. The young women also take turns at Sunday work, so that one of them is on duty every Sunday afternoon. There are now 643 instruments working from the office in this city. There are 8 switchboards, with a capacity of 35 wires each, and about 175 wires are now working. Conversation can now be carried on as far north as Brattleboro, Vt., east as far as Boston by repeating at Worcester, west as far as Albany by repeating at Pittsfield, and south to Bridgeport by repeating at New Haven, and scores of intervening towns and cities are also connected. The rules of the office are necessarily strict, and visitors are not always allowed in the operating room. The switch-boards used in this exchange are made by the Providence Telephone and Electric Company, and are fitted with the Wilson looping-in arrangement. On the roof is the cable house into which all the wires, in cable or otherwise, run straight; they are then run as desired to the attic in such irregular order as a large exchange, as this must run their circuits; from this point they continue direct to the switch-board. Mr. Daboll, in putting up his new boards, utilized the method adopted first by Manager Farnham at Portland, Me., and run his wires from the ceiling above through tubing to the back of his switch-boards, and thus avoids the untidy appearance feared in many exchanges where the wires come in all over the room. Springfield now has one of the finest exchanges in the United States, as the report of committees on exchanges to the National Telephone Association has shown; and we doubt not that under the enterprise of division superintendent Daboll, and the careful discipline of Manager Carlton, it will more than hold its position during the coming year.

Measuring Telephonic Sounds.

In the *Annalen der Physik und Chemie*, Vol. XIX., Heft 1, No. 5, Herr K. Verordt gives an interesting account of his experiments on the measurement of the decrease of sound in the telephone, of which the following abstract appeared in the *Journal of the Society of Telegraph Engineers* for September: "Two of Siemens and Halske's telephones, of the latest pattern, were placed in two rooms so far apart that no direct sound was transmitted, and were connected up in simple circuit. The first telephone was placed 3cm. above a tin plate 222mm. by 172mm. and 8.2mm. thick, lying on a table. The second telephone was fixed in a stand. While the experimenter listened at the second telephone, taking care that his ear did not touch it, an assistant let fall lead bullets from varying heights on to the tin plate below the first telephone. The source of sound was thus the shock of the bullet on the tin plate. Starting with a heavy bullet and a considerable fall, the assistant gradually decreased both, as directed through the telephones by the experimenter at the other end, until a sound was produced under the first telephone which was only just audible in the second. The experimenter now placed his ear at the same distance, 3cm. above the tin plate, as was before occupied by the first telephone, and the assistant again let fall bullets from various heights until a point was reached at which the sound, heard thus directly, was only just audible. If we call the former sound S^1, and the second S, the loss of sound by transmission will be $S^1 - S$. In an experiment tried at night, when all was quite still, a sound was just heard in the second telephone, when a bullet weighing 1,542 mg. was let fall from a height of 7 mm. on to the tin plate. The strength of the sound was then calculated to be $S_1 = 1549 \times 7^{0.62} = 5176$mg mm. When listening directly, a sound was just heard when a bullet weighing 2.4mg. was let fall from a height of 12mm. Hence $S = 2.4 \times 12^{0.62} = 8.95$. Hence, when expressed in units of sound of the tin plate, which weighed 2,406g., the loss of sound was $5,176 - 8.95 = 5,167.1$. It should be added that the exponent of the height of the fall was found by Oberbeck's method. Two lead bullets, respectively 2,073mg. and 888mg., hence $\frac{P}{p} = 2.334$, gave the coefficient 0.6196, or in round numbers 0.62 in the one case; and two other bullets respectively 17.5mg. and 8.75mg., $\frac{P}{p} = 2$, gave 0.529, or nearly 0.53."

Telegraphic.

A Brief Review of the Telegraph Service of the Northwest Under Western Union Ownership.

The growth of the telegraph service in this country has been so rapid, and withal so silent, that its magnitude no longer attracts the attention that it deserves; and of no part of the nation is this more true than of this developing Northwest, where, but three decades ago, a dog sledge or a mounted courier was the swiftest vehicle at hand for the transmission of important news, and the Pacific slope was farther off than London or Paris. One among the not least interesting histories of this region is read in the records of the Northwestern service since the Western Union Telegraph Company obtained control of the various lines west of Chicago, which occurred two years ago. At that time the old Northwestern Telegraph company, owned by capitalists principally of this section, operated most of the lines in Upper Michigan, Wisconsin, Minnesota, Northern Iowa, Montana and Dakota, and in Northeastern Nebraska. The company was favorably known to its patrons, and rendered efficient service, but the scheme of development of the Western Union included the territory it occupied, and on the 1st day of July, 1881, the latter corporation acquired, by a lease of 99 years, the full ownership and control of all the lines formerly operated by the Northwestern, which thus passed out of existence. The western limit of the Montana line was then at Glendive, the total mileage of poles acquired being 8,270¼, and the total mileage of wire 15,533¾. This apparent discrepancy is explained by the fact that over many miles of the line two or more wires are stretched, the former figures thus being seen to represent the actual lineal extent of country served by the company. Along this line 874 offices were established and in operation, and passed into the hands of the Western Union.

THE INCREASE.

In the two years which have elapsed since the change of ownership, the Western Union company has set 3,400 miles of poles, strung 10,049 miles of wire, and established 193 telegraph stations, making the present total of their lines (at the end of the fiscal year) as follows: Mileage of poles, 11,670; mileage of wire, 25,572; number of offices, 1,067. This increase has been general throughout the territory covered by the superintendency of Mr. McMichael, and which is the same as that included in the lease from the Northwestern Company. It covers not only the independent offices set up by the company, but the offices on the railroads which are operated in the interests of both the roads and the telegraph, the former furnishing the operators and the latter building the lines. It has cost, up to Jan. 1, 1883, the first eighteen months of the Western Union ownership, $215,830.63, an amount considerably greater than that expended by the company upon any other equal territory, and warranted by the extraordinary activity here prevalent in pushing the construction of railroads into hitherto undeveloped country. New lines have been built along the route of the Northern Pacific to Wallula Junction, Wash., and on the Northwestern and Hastings and Dakota to Huron and Aberdeen, and on the Omaha to Bayfield and Ashland. Additional wires have been strung to accommodate the increase of commercial business as follows: One from St. Paul to Sioux City, one from St. Paul to Milwaukee, one from St. Paul to Bismarck via Fargo, one from St. Paul to Winnipeg via Glyndon, one on the Wisconsin Central from Milwaukee to Abbotsford, and from Milwaukee to Stambaugh, in the Upper Michigan copper regions, and an additional wire is now being put on the line of the Northwestern road from St. Paul to Elroy, to be used in the transmission of Chicago business.

THE PRESENT TERRITORY

of Superintendent McMichael covers Wisconsin, except Milwaukee, and lines thence to Chicago, Upper Michigan, Minnesota, Dakota, and Montana, the Chicago, Milwaukee, and St. Paul lines in Northern Iowa, down to and including the Iowa and Dakota division, Omaha and points north in Nebraska, and the Minneapolis and St. Louis road to its terminus at Angus. All the lines on the western division of the Northern Pacific road have recently been added to this district. Superintendent McMichael built the line as far west as the point where the golden spike was driven, 52 miles west of Helena, where he met the line building by Superintendent Jaynes, of San Francisco; and on Oct. 1, of this year, the lines west of that point were transferred to this district. There are now in operation three wires to Helena and one beyond, with two others being rapidly constructed, four to Bismarck, six to Fargo, two to Aberdeen, four to St. Vincent (connecting with the Great Northwestern Telegraph Company of Canada, for Winnipeg), one to Devil's Lake City, four to Brainerd (continued to Fargo), six to Milwaukee, and four to Chicago, two via Milwaukee, one direct, and one through Iowa; in addition to which are the lines to Pierre, Omaha, etc., above enumerated. The vast increase of facilities has, of course, caused something of an increase in the number of operators employed, the principal gain having been in St. Paul and Bismarck; though Minneapolis, Fargo, and Duluth have also come in for a share, St. Paul having now forty-five operators and Bismarck five. This gain is explained by the fact that all business with Helena is repeated at Bismarck, while St. Paul handles, practically, all the outside business of the district, the relay business being about four times the local. The increase in local business all along the line has been most gratifying, and of very general extent.

A PROJECTED IMPROVEMENT.

At present most of the commercial business between the Pacific slope and the East is transacted by way of San Francisco and the Central and Union Pacific roads, but a scheme is now developing by which the telegrams of Oregon and Washington shall be diverted from their present route and brought over the Northern Pacific. This will necessitate more wires, especially west of Helena, which are now in process of stringing, and the line is expected to be in working order within a short time. The gain by this change in point of time and expense will be considerable.

RAPID WORK.

The seeming discrepancy noticed in the foregoing tables of wires, three running to Helena and only four to Chicago, brings into question the employment of one of the wonders of the age, the duplex and quadruplex system of transmitting messages. The wires to Helena are worked under the old Morse system of one circuit on one wire; but the lines to Chicago, Milwaukee, and Winnipeg are worked on the quadruplex system, and really represent the facilities of four times the number of wires, while keeping the cost of construction and maintenance at the ratio of a single wire. By the use of the quadruplex system, one side of the wire between Winnipeg and Chicago is used for through business, while the other side is perhaps employed with local business between St. Paul and Winnipeg and St. Paul and Chicago. The system has even been employed successfully from St Paul to Toronto by way of Chicago and Detroit.

The New Cable Company.

A new cable company (which probably will be called the Merchants') has been formed for the purpose of laying two cables between this country and England. Ex-Postmaster-General James has accepted the presidency of the company. The Board of Directors includes representatives of prominent business houses in this country and Europe. Among them are David A. Bingham, of David Bingham & Brothers, Liverpool; A. D. Straus, of A. D. Straus & Co., also a foreign firm; E. R. Livermore, of E. R. & R. B. Livermore; John F. Plummer, of Pomeroy & Plummer; John H. Hebert, of Hebert & Allen; William H. Guion, of Williams & Guion; E. A. Quintard and Alexander H. Rice, ex-Governor of Massachusetts. The capital stock of the company will be $6,000,000, and bonds will be issued for a like amount. No contract has been completed for the building of the cables, but negotiations are approaching, it is said, a successful termination. The cables are of a new kind, and possess peculiar advantages, directors of the company assert, over any cables now in operation. The cable will be landed on Long Island, but the landing on the English side has not yet been selected.

A Telegraph Company Incorporated.

A certificate of incorporation of the Postal Telegraph and Cable Company was filed yesterday in the office of the County Clerk. The company announces that its lines will extend throughout the United States and Canada, also into Mexico, and beginning near Greenpoint, L. I., will extend across the Atlantic to London, Liverpool and Paris. The capital stock of the company is $1,500, divided into fifteen shares, with the privilege of increasing it. The incorporators are Henry C. Gardner, Luther R. Marsh, T. H. Dupuy, Andrew W. Kent and Dumont Clark, each holding three shares.

A cable consisting of four wires is to be laid between Sweden and Denmark.

The telegraph line between Zimpam and Jalcala, Hidalgo, Mexico, will soon be completed.

W. K. Applebaugh, an ex-army operator, died at his residence in Philadelphia, October 21st, from exhaustion produced by malaria and blood-poisoning. He was chief operator in the Western Union Telegraph Company's main office in this city, then assistant superintendent of the Gold and Stock Telegraph Company, superintendent Manhattan Telegraph Company, superintendent Atlantic and Pacific Company, and superintendent Bell Telephone Company.

The Telegraph in Central Asia.

The *Commercial Bulletin* remarks that "the new telegraph line between Samark and Bokhara which is the first constructed in Central Asia, and which has been made by the Russian Government, will be opened to the public next month. Communication will thus be opened between the silk merchants and manufacturers of Europe and the principal markets of Central Asia for cocoons and silk. Bokhara already contains 27 silk mills and 564 silk merchants. At present there is not even a regular postal service with Bokhara."

Two New Cables Projected.

A dispatch from Paris yesterday announced that J. W. Mackey, President of the Postal Telegraph Company, and James Gordon Bennett had recently signed a contract for two Atlantic cables with Siemens Brothers, of London, and that the cables were already under construction and would be laid by next June. Mr. Mackey is in San Francisco, but a director of the Postal Telegraph Company said that the report was true and that the cables would be operated in connection with the land lines of the Postal Company. When asked about the cable company started by Alderman Hadley, of London, with which the company made a contract, he said: "Oh, the Hadley scheme was only a paper one; there wasn't any money back of it. These cables will be laid, and by the time promised. They will be operated exclusively with the lines of this company."

Telegraph Officers Elected.

CHICAGO, October 18.—At the annual meeting of the Baltimore and Ohio Telegraph Company held here to-day the following officers were elected: President, George H. Frick; Secretary, G. K. Bruce; Directors, Bradford Dunham, J. Morton Hall, and T. H. Dearborn.

A New Invention in Telegraphy.

Mr. Patrick B. Delaney has invented telegraphic appliances by which, he says, six operators can send six messages at the same time over a single wire. Part of the six can send messages in one way while the rest are sending them in the other direction. This will give a wire three times the capacity which it has with a quadruplex instrument. Twenty-four Morse instruments can be connected with one wire by this system. Twelve messages can be sent simultaneously at the rate of twenty words a minute. He says that the system has been worked over a wire between New York and Boston. An exhibition will shortly be given to electricians and representatives of the various telegraph companies. The last patents were issued on Oct. 9.

CHICAGO, ILL.—A bill has been filed in the circuit court against the 25,000 stockholders of the defunct Great Western Telegraph Company to recover the amount unpaid on their stock, or so much as may be necessary to pay the debts of the company. Its liabilities are upward of $3,000,000, and are mostly held by parties who have bought them up at a small percentage of their face value. The assets of the company were sold years ago for a very small amount, and the proceeds applied to pay expenses.

Southern Times Telegraph.

This company has been chartered at Nashville, Tenn. It is authorized to operate in Virginia and West Virginia, Tennessee, Georgia, North and South Carolina, Florida, Alabama, Mississippi and Kentucky.

The American Rapid Telegraph Company, involving the consolidated interests of their lines in the States of New York, New Jersey, Ohio, Connecticut, Massachusetts, and Pennsylvania, and the city of Baltimore, have executed a mortgage upon their property and franchises to the Boston Safe Deposit and Trust Company for $3,000,000, bonds of $1,000 each being given for the entire amount, payable on the 15th day of September, 1893. The interest at six per cent. is to be paid semi-annually, coupons calling for the payment of $30 on the 15th of March and the 15th of September of each year being attached to each bond. The mortgage was filed in the register's office at White Plains. A copy of the mortgage will be filed in each town in Connecticut through which the lines of the company pass.

New Telegraph Line.

The American Rapid Telegraph Company will commence work shortly on a new route of ten wires between New York and Boston. The new wires will follow the company's old line from Hartford to this city. The contract for furnishing the poles has already been awarded. Work will be begun next Monday at each end of the proposed line, and it is expected that the line will be completed in a few months.

NEW YORK, October 24.—The Bankers' and Merchants' Telegraph Company have taken possession of the building at No. 187 Broadway, formerly occupied by the American Rapid Company. The lower floors have been handsomely fitted up and will be occupied by the executive officers. The lines of the Rapid and Southern companies are concentrated together with the Bankers' and Merchants' wires, in one general operating-room, while additional wires are being constructed in all directions. The mileage of the wires controlled by the Bankers' and Merchants' is now but little less than that of the Mutual Union system.

The son of ex-Governor Andrew of Massachusetts, who was recently celebrated for condescending to do the work of a lineman in the telephone business, in order to learn it from the bottom, is now said to have married a girl worth $8,000,000, and been nominated for the State senate.

Telephonic.

Telephone Vibrations from Portland, Maine.

Our exchange is still growing, and we are one of the score of exchanges who have "more subscribers in proportion to the inhabitants" than any other place in the world! Our percentage is one to forty.

The central office (described some months ago in your journal) is working very smoothly. We can, as yet, hardly see how any improvement in the switch system can be made—a new operator here, with our perfect number system, can learn in a few days' time to do good service.

It may be worth your space to describe how one difficulty has recently been overcome.

We had two fixtures of wires over a church—the wires so covering the slate roof that it was deemed by the parish necessary to request us to vacate forthwith. The superintendent looked the ground all over, and concluded the easiest and best way to get *round* that trouble was to *go through* it, so with permission the twenty wires were taken into the church attic at the tower and emerged at a rear window.

Mr. Fanham has just inaugurated a new way (to us at least) of locating crosses which so far promises to be very successful considering its simplicity.

When a cross appears he immediately takes the office end of both crossed lines to a test table arranged for the purpose and measures the resistance of this metallic circuit, formed by the two lines and the cross—knowing the average resistance of the line wire per mile, and the resistance of subscriber's bells, it is but a minute's work to estimate the distance from the office that the cross must be. It is evident in this test no ground returns or other circumstances likely to materially vary the result are present.

Open lines are tested very readily by the amount of induction noticeable, and by the leakage noticeable by a tap of the transmitter, but as crossed lines in any exchange of considerable size must be more frequent than any other single line trouble, we think this method of testing for the location may interest your readers. We use a differential galvanometer and rheostat; this or the "bridge" should be used to get an accurate result.

A dividend of one and one-half per cent. on the capital stock of the Iowa Union Telephone Company has been declared payable on October 15th inst. to stockholders of record October 1st.

The officers of the company are pleased to state that the net earnings for this, the first quarter of the company's existence, have been sufficient to meet the above dividend and leave a surplus account of an additional *half per cent.*

The funds provided at the organization for construction have been expended principally in building toll lines connecting the different exchanges, and the earnings from these lines during the short time they have been in operation show conclusively that it is for the interest of the company to continue to build such lines as rapidly as funds can be obtained and the work economically done.

Through the courtesy of Mr. A. D. Bullock, the Queen City Club, of Cincinnati, extended to the members of the Telephone Convention the privileges and hospitality of that club in true Cincinnati style.

A Recording Telephone.

Engineering (London) says that Mr. St. George, the inventor of the telephonic system recently brought out, has devised a means of recording a telephonic conversation by the aid of photography. A circular plate of glass is coated with collodion, and made sensitive as a photographic plate. This is placed in a dark chamber having a small slit, through which a pencil of light can fall upon the sensitive surface of the glass. The vibrating telephone plate actuates a shutter which varies the thickness of the luminous pencil correspondingly to the vibrations after a plan introduced by Professor Graham Bell, if we mistake not. The pencil falling on the photographic plate prints a dark line on it, whose thickness is proportional to the vibrations of the telephone plate. The plate is revolved by clockwork like the barrel of a phonograph, and the record is afterwards chemically fixed.

The Iowa Telephone and Telegraph Company, under its present efficient management, has been making very rapid strides during the six months last past. They have 2,000 miles of lines connecting the principal towns in that State, and over 3,000 subscribers connected, besides 200 private lines in operation. General Manager L[illegible]17 and General Superintendent [illegible]sen are deserving of great credit for the excellent progress they have made out there, and we shall give at an early day some further information showing the favorable condition of the business in Iowa, which is somewhat in advance of other points.

This company completed a line from Elkhart to Warsaw, Ind., October 17, and now connects all the important towns in the northern part of Indiana. This fills the gap, and makes a continuous telephone line from Lake Michigan to Cincinnati, O. Conversation was carried on from Elkhart to Marion, Ind., a distance of 100 miles, very successfully, the day the line was opened.

The certificate of association of the New England Telephone and Telegraph Company has been filed. The capital stock is fixed at $50,000 and a provision made for its increase, but not, however, to exceed $20,000,000. The company's lines are to run from this city through various cities of Massachusetts, Rhode Island, Connecticut, Maine, New Hampshire, and Vermont. The corporators are Wm. P. Ingham, Chas. J. Gidden, Loren N. Downs, Wm. H. Bent, Nathaniel W. Lillie, Chas. E. Adams, Moses G. Parker, Augustus G. Sanborn, and Chas. L. Knapp, all of Lowell.

The Rocky Mountain Bell Telephone Company, headquarters in Salt Lake, has acquired the sole right to the Territories of Utah, Wyoming, Montana, and Idaho, and has eleven exchanges and over 1,000 instruments in successful operation. The capital stock of the company is $800,000, divided into 800 shares of $100 each.

It is an assured fact that the present telephones in use are suitable for distances not exceeding 100 miles, and Mr. Timpson says there would be no trouble in talking from Auburn to Syracuse, Rome and Utica.—*The Bulletin.*

The new Milwaukee Telephone Exchange was visited recently by W. D. Sargent, of Brooklyn, general manager of the New York and New Jersey Telephone Company; H. B. Lytle, of Boston, general manager of the Telephone Dispatch Company, Boston, and Chesapeake and Potomac Telephone Company, Washington and Baltimore; G. L. Beetle, general agent Western Electric Company, Chicago; T. B. Doolittle, of Boston, special agent of the American Bell Telephone Company; F. B. Knight, of Boston, of the same company; G. T. Manson, superintendent of supplies of the Lowell Telephone Syndicate, Lowell, Mass.; S. C. Cortright, Allentown, Pa., superintendent of the Pennsylvania Telephone Company; E. L. Smith, Kansas City, superintendent Kansas and Missouri Telephone Company; J. E. Seely, New York, electrician of the Metropolitan Telephone and Telegraph Company.

The party consisted of delegates to the annual convention of telephone men in Cincinnati, held Oct. 16 and 17. They arrived in the forenoon, inspected the workings of the local exchange, and left on the late train for Chicago, after viewing the principal points of interest in the city. Mr. Sargent, who remained, will depart for home this afternoon. During their stay in Milwaukee, the party were entertained by C. H. Haskins. Their mission here was the inspection of the new Western Electric Multiple Switch-board in active operation in a large office. The world is at present evincing great interest in this apparatus, and as the Milwaukee exchange is the largest in the United States using this patent, and other cities are about adopting it, such as Baltimore, Boston, Washington and Brooklyn, the gentlemen comprising the party were desirous of viewing its workings on a large scale and profiting by the experience of the local exchange. This city is the first large place in which the board has been introduced. There are about 1,000 subscribers here, while the Boston exchange possesses about 1850, the Baltimore and Washington exchanges about the same number, and Brooklyn 1750. The party were very much pleased with the electrical arrangements here. They also tested the long lines running from Milwaukee, talking with offices over 100 miles distant, and were unanimous in their opinion that no other city which they visited was connected with long lines which worked as admirably as those centering in Milwaukee.

The Tropical American Telephone Co., Limited.—Capital, $400,000; 40,000 shares, $10 each. Principal office, No. 95 Milk Street, Boston, Mass., U. S. A.

This company, organized in November, 1881, acquired from the Continental Telephone Company, of Boston (the assignee of Prof. Alexander Graham Bell, Francis Blake, Watson, Anders, Roosevelt, Fuller, et al.), all telephone rights formerly its property in Central America, United States of Colombia, Venezuela, British, Dutch and French Guiana, Chili, Peru, Ecuador and Bolivia, South America, and all the West India Islands, except Cuba (already ceded to the Cuban Company). By subsequent purchase this Company obtained from the Continental Telephone Company all its existing telephone rights in the remaining countries of South America, including many valuable contracts with subsidiary companies, and now has the sole and exclusive right, for a term of years to sell, lease, and use "Bell" Telephones, "Blake" Transmitters, and all other telephonic apparatus manufactured by the American Bell Telephone Company, under patents owned or controlled by it in the United States and Canada, in the entire territory of South America, Central America, the West Indies and Mexico.

This company now becomes the source of supply to the following Telephone Companies already organized and doing business, viz.:

1. The Inter-Continental Telephone Company, controlling Central America, United States of Colombia and Venezuela. Principal office, No. 95 Milk Street, Boston, Mass., U. S. A.

2. The West India Telegraph and Telephone Company, controlling Jamaica, Porto Rico, Hayti, San Domingo, etc. Principal office, Chillicothe, Ohio.

3. The Compania Electrica de Cuba, controlling the Island of Cuba. Principal office, 62 New Church Street, New York City.

4. The Mexican Telephone Company, controlling the Republic of Mexico. Principal office, 53 Devonshire Street, Boston, Mass.

5. The Columbia and Panama Telegraph and Telephone Company, controlling United States of Colombia and Panama, a subcompany to the Inter-Continental and Telegraph Company.

6. Companhia de Telegraphos Urbanos, operating in Bahia, Pernambuco, Santos, Rio Grande, and elsewhere in Brazil. Office, Rio de Janeiro, Brazil.

7. The United Telephone Company of the River Plate, Buenos Ayres, controlling the Argentine Republic, Uruguay and Paraguay. Principal office, Buenos Ayres, South America.

8. The West Coast Telephone Company, Limited, controlling Chili, Peru, Ecuador and Bolivia. Principal office, Valparaiso, Chili.

All orders for instruments and apparatus to be used in any of the above countries should be addressed to the Company operating in that territory.

The Tropical American Company has established "Exchanges" in Barbadoes, Trinidad, and in other of the West India Islands, and will supply the "private line" telephone business throughout the entire territory now under its control.

Applications for territory, with exclusive right to use telephones, should be addressed to the Company direct.

Principal office, 95 Milk St., Boston, Mass.

Officers and Directors: H. S. Russell, President; J. H. Howard, Vice-President; Chas. W. Jones, Secretary and Treasurer; Directors: H. S. Russell, of Boston; F. M. Delano, of New York; Nathan Appleton, of Boston; Chas. Williams, Jr., of Boston; J. H. Howard, of Boston; J. D. Haines, of New York; Chas. W. Jones, of Boston.

Stock transfer office, Long Branch Banking Company, Long Branch, N. J. T. C. Morford, Cashier, Transfer Agent.

Extending the Service in Western New York—New Manager in Jamestown.

Since the telephone interests of Western New York came into the control of the New York and Pennsylvania Telephone and Telegraph Company there have been many improvements and facilities added. Recent changes have been made whereby Mr. F. W. Conn, of Dunkirk, has been called by Mr. W. N. Eastabrook to the general management of the company, with headquarters at Elmira; and Mr. J. W. Stearns, of Warren, has been entrusted with the superintendency of this district. The Jamestown, Corry and Mayville exchanges and radiating lines have been placed in charge of Maj. J. H. Francis. The interests of the company and of the patrons of the various exchanges will be efficiently cared for by these officials. Maj. Francis was for years connected with the *Press* of Alabama, and will be remembered by those New York State editors who visited the former State a few years ago. He was also for several years one of the clerks of the House of Representatives in Washington, D. C. Maj. Francis will probably remove his family here, and make Jamestown his permanent home. In taking his present position he becomes identified with Jamestown's business interests, and should receive a cordial greeting.

In the Jamestown exchange there will be many improvements, and the service will be increased as rapidly as possible. Mr. M. M. Wood will act as assistant manager, Miss Laura Wilson as day operator, and Mr. Alex. P. Wood as night operator. The central office has been newly decorated, the wood work painted, and the employees provided with conveniences for their work. There are one hundred and thirty telephones now connected by wires with the Jamestown exchange, a round dozen of new subscribers having been secured recently.

The villages of Busti and Sugar Grove are now within speaking distance of Jamestown, and Warren will be connected with Jamestown by telephone wire by the close of the week. The line from Dunkirk to Jamestown, and thence to Warren, will be completed soon, and then patrons of the local exchange will be able to talk along a wire to persons in Dunkirk, Fredonia, Laona, Stockton, Cassadaga, Sinclairville, Moons, Vermont, Ross Mills, Falconer, Frewsburg, Fentonville, Russellsburg, North Warren, Warren, Sugar Grove, Busti, Mayville, Chautauqua, Westfield, Corry, Columbus, Spring Creek, Garland, Pittsfield, Youngsville, Irvineton, Stoneham, Clarendon, and Sheffield. The rates for messages between any two of these points will be reasonable. Maj. Francis is thoroughly acquainted with telephone matters and he proposes to make the Jamestown exchange a model, and to give its patrons every possible facility for communication with surrounding towns. He anticipates that the list of subscribers will steadily increase.—*Jamestown Letter.*

The "Hammer" Telephone.

The London *Electrical Review* publishes the following letter concerning the above instrument:

I am pleased to find so much interest taken in the new theory, by which I have explained the working of the "Hammer" telephone. After my first experiments I was convinced, in my own mind, that the undulatory current theory of Prof. Bell could not account for the telephonic transmission in my instrument, but I foresaw the objections which had to be encountered by a new idea in direct contradiction to those generally held.

So I have varied and multiplied my experiments in every possible manner, in order to dissipate the last doubts that might remain; and it is only after having observed the perfect harmony of the results of all these experiments that I have confidently determined to fulminate my theory.

I intend to publish shortly a complete work on the subject; but I do not wish to leave, without an immediate answer, the five questions which Mr. F. W. Cooke asks in the *Electrical Review* for September 1st. It would be difficult to condense the objections to my theory in a better manner than does this correspondent. I thank him for the interest which he takes in the success of my telephone; I hope that the replies which I am about to make to his questions will satisfy him entirely.

"What constitutes a flexible organ?"

I answer: The flexibility of a body is the property, in virtue of which certain parts of this body may, under the influence of a slight force, undergo displacements relative to other fixed parts of the body, and, after the action of the force ceases, return to the original position, after some oscillation.

Every straight or spiral spring constitutes an eminently flexible organ—a thin, stretched membrane constitutes a flexible organ in which the organs are tympanic; that is to say, it is no longer an extremity, but the center of the membrane which undergoes displacement. For the membrane we may substitute a thin disc as in the Bell telephone, without destroying its flexibility. But in proportion as the thickness of this disc is increased, its suppleness and its flexibility, which are the same, diminish, until we obtain a piece practically inflexible. When, for the thin and flexible iron plate of the Bell telephone, we substitute a plate only $\frac{1}{10}$ of an inch thick, the effect in the telephone is almost nothing. This is a fact which cannot be, and is not disputed by any one.

Now for the "Hammer" telephone, in which the contrary takes place. When we diminish the thickness of the organ against which the hammer rests—that is to say, when we transform this organ into a supple and flexible piece—the effect of the apparatus is considerably lessened. It is when this organ has a minimum thickness of $\frac{1}{16}$ inch—that is to say, when this piece is practicably inflexible—that the effect is at the maximum. This clearly shows that the production of sound is not due to a series of deflections of the organ.

On the other hand, when we attach to the rigid piece the extremity of the lever armature, the sound is nearly destroyed.

We could not certainly say that a wooden piece of the form represented in section—natural size—in the accompanying sketch, and which would suit perfectly as the organ for receiving the shock in my telephone, is accurately described as I have made it, as a rigid inflexible piece.

The qualification inflexible, as I have employed it, is therefore appropriated to the organ indicated, and it should be taken in the ordinary and practical sense attached to this word. This is my reply to the first question. I now come to the second.

"Under what conditions are wood, glass or ebonite unsusceptible of undulatory movements, as these subjects under ordinary circumstances possess the two essential properties for the propagation of sound, viz., elasticity and density?"

I have never pretended that wood, glass and ebonite were incapable of undulatory movements. What I said, and what I consider correct, is, that in the arrangement given in my telephone these undulations can only have a duration and amplitude infinitely small compared with those of the sound waves of the air, and that consequently these materials are not susceptible of the undulatory movements, which are, according to the theory of Bell, the reproduction of the *facsimile* of the sound waves of the air.

I pass on to the third question.

"Assuming *D* to be thick, rigid, inflexible, and unsusceptible of undulatory movement, by what process are the impulses, or, as M. De Locht-Labye puts it, sudden shocks, conveyed to the lever *L*, when the instrument is used as a transmitter?"

I reply that this transmission is made by a phenomenon analogous to the well-known phenomena of ivory billiard balls. I find a note upon these phenomena in the journal *Cosmos les Mondes* (January 13, 1883, page 49), by M. le Capitaine Trêves, communicated to l'Academie des Sciences. I extract the following paragraphs from it, which are conclusive for explaining the transmission of the sound shock in my telephone employed as a transmitter.

"Here we have suspended from a common support several equal-sized ivory billiard balls, in contact and ranged in a straight line; let us call them, starting from the left, *A, B, C, D, E*, for instance.

"We withdraw the first *A* to any angle whatever, and let it fall. It strikes the next ball *B;* then it remains at rest, having given up all its velocity to *B*, which transmits it to the third *C*, and finally, from ball to ball to the last one, which raises itself and falls again with the same velocity as had at first *A*.

"That which is most striking in this experiment is the absolute immobility of the three intermediate balls, *B, C, D*, which only serve to transmit the movement from the first ball *A* to the fifth *E*, and reciprocally. The two last balls move as if there was nothing between them—as if they were alone. The three intermediate balls form like a conductor of energy, but they can only play such a part by storing up successively the quantity of movement imparted to the first ball *A*. There is no effect without cause; each of the intermediate balls in its immobility must be the seat of a special movement, which we can prove by an extremely simple process. For this purpose I cover abundantly, with any metallic filings whatever, the upper part of all the balls; then I proceed as before.

"What happens?

"Let us observe the central ball *C*, for instance. The filings do not incline to the right or to the left, as we might have imagined, under the influence of a vibratory motion, 'foreseen,' although useless. The filings accumulated upon this absolutely motionless body are strongly projected in the direction of the shock, or, rather, of the dynamic current. * * *

"* * * We remark besides this other interesting phenomenon. There is no projection of all the filings heaped around the point of suspension of each ball. It is only the half, and this that which is upon the opposite side from the shock. Thus, if it takes place from *A* to *E*—that is to say, from left to right—it is always the filings on the right portion of each ball which are strongly projected towards *E;* the other mass of filings does not move." * * *

"In my 'Hammer' telephone the lever armature *E* may be compared either to the last ivory ball *E*, or to the metallic filings projected in the direction of the shock. The rigid body *D* occupies the place of the intermediate balls. The sound wave, in striking the rigid body, fulfills the office of the ball *A*. It follows, then, that the intermediate rigid body *D* remains apparently absolutely motionless, communicating motion to the armature lever *L*, which is momentarily separated.

It is besides well established in mechanics that when a body possessing a certain quantity of movement encounters another, it imparts to it all or part of its force, and provokes the movement of the body struck if that is relatively more mobile than the first. The transmission of motion from the string of a bow to the arrow furnishes a striking example, very similar to the action of transmission in my telephone.

I think that the explanation of this phenomenon has been formulated in terms sufficiently clear, so that more would be superfluous.

Mr. Cooke then asks me:

"Supposing *L* to have received a given number of shocks of a certain intensity—say, a musical note produced by the human voice—how does it (the lever) discriminate between this and the same note of equal intensity, sounded on a violin; in other words, how is the timbre transmitted?"

It is very easy for me to answer this question.

It is now well established in physics that the timbre of a sound is due to the coexistence with the fundamental sound of other sounds called harmonics. But these could be as perfectly transmitted by the aid of my telephone by sudden shocks equal in number with the vibrations which constitute these secondary sounds, as the shocks which characterize by their number the fundamental sound. It is, therefore, evident that my telephone can receive and transmit sounds emitted by various sources and preserve all their qualities.

Lastly—"Since all the movements are sudden, and in no way possess a duration equal to that of a sound wave of air, how is the sound wave reproduced at the receiving end?"

It is not recognized or established in physics that, between the source, the origin of a phenomenon and its manifestation or its reproduction at a distance, all the characteristics peculiar to this phenomenon must have been preserved. The contrary is most often the case. Thus, does not the luminous ray which passes from one medium into another undergo refraction and dispersion—that is to say, modification of its direction and its coloration? and when it passes again through a medium of the same nature as the first, does it not resume its original form—that is to say, a direction parallel to the first and a coloration similar to that which it had at first?

Is not reversibility of phenomena recognized as an almost general fact in every branch of physics? Thermo-dynamics is founded upon the principle of the reciprocal transformation of sensible heat into mechanical motion, and of external work into caloric. The transmission of power to a distance by dynamo-electric machines is, moreover, a remarkable example of this fact of the successive transformations of the manifestations of a force in such a manner as to produce as a result phenomena identical in nature with those which were originally produced.

As for the transmission of sound through various media, it is easily explained. The propagation of the sound in these media is not produced in the same manner. The speed of propagation by solids is from ten to fifteen times that of the propagation by gas. It is quite evident that the duration and amplitude of the vibrations is altogether different. But there is nothing to prevent the sonorous vibration, in being communicated from a gaseous to a solid medium, changing its character and after being propagated according to a special law in the whole extent of this solid, returning to the air and resuming the characteristic properties of its transmission through this medium, and consequently producing upon our auditive sense a similar impression to that which would be produced by direct transmission. It is the same with the mechanical phenomenon of the ivory billiard balls of which the last *E* receives from the ball *A*—notwithstanding the intermediate balls—motion apparently identical with that which would have resulted from a direct shock.

My replies to the questions proposed by Mr. F. W. Cooke is, I think, as complete and categorical as could be desired. Evidently, each of these ideas could be developed, but I fear I have already given them at too great a length.

LEON DE LOCHT-LABYE.

Liege.

At the Telephone.

Hello-ello! your charming voice
Thus strikes me every week,
The while you ask, in language choice,
With whom I wish to speak.
I do not even know your name;
Or where you go, or whence you came,
Although I ever seek—
I know that you are "Number Four,"
But positively know nothing more.

And when I wish to talk with Jones,
I find that, without fail,
I ever am, 'mid mutual groans,
Connected with the jail;
But never notice that, my dear,
For I would gladly wait a year
To hear your pretty tones;
From any one 'twould be a bore,
Excepting you, O "Number Four."

I wish that I could see your face,
As you sit by your "phone";
I think it must be full of grace,
But judging by your tone.
Of course your age I do not know—
I think it's twenty-one or so;
But that you would not own,
It may be forty-five or more,
For all I know, O "Number Four."

Well, I suppose we'll never meet;
I hear but wish to see;
I would not know you on the street,
And you would not know me.
Thus ever was the human lot—
To be unknown, or else forgot—
But still we friends may be;
Perhaps upon the Stygian shore—
In Charon's boat, O "Number Four!"

—*Puck on Wheels.*

Western Electric Company has just received an order from the Lancashire and Cheshire Telephone Company for a 1,000 wire multiple switch board for Liverpool.

According to statements made at a meeting of the Berlin Electro-Technical Society, there are now telephonic arrangements in eighteen German cities, comprising 3,788 different stations; length of telegraphic lines used in this service, 540 miles; length of single wires, 4,016 wires.

Plans of a New Acoustic Telephone Company.

The certificate of incorporation of the New York Telephone and Telegraph Company was filed in the office of the County Clerk on Friday last. The incorporators are Joseph H. Mandeville, George Gehe, and George D. Hyde. The first two are insurance agents. The capital stock of the company is fixed at $1,000,000, divided into 10,000 shares of $100 each. Each of the incorporators owns three shares. The purpose of the company, as set forth in the certificate, is to construct and operate telephone and telegraph lines in this city between the different exchanges, banks, safe deposit vaults, the Federal, State, and local courts, the offices of insurance and railroad companies, and private residences. The right is reserved to connect with the lines of other telegraph and telephone companies, or to extend lines through this State or the United States. Mr. George Gehe said last evening that the company was organized to do a telephone business, although under the general act for the incorporation of telegraph companies. It had bought of the Consolidated Telephone Company, of which John C. New is President, the right to use in this State the acoustic telephone owned by that company. The telephone, Mr. Gehe said, was an exceedingly simple device, and used no electricity. The lines could be constructed at a very small cost, the light copper wire used needing no heavy poles, but only slight supports.

Speaking of visiting, did it it ever occur to you that the telephone girl answers more "calls" in one day than other ladies do in a month?

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Gas as a Fuel.

The advantages of coal gas as a fuel have often been shown in these columns. We have never prophesied that the introduction of the electric light would drive coal gas out of the market. On the contrary, we have declared it as our opinion—the truth of which, by the way, has recently been demonstrated—that there was abundant room for both the electric light and gas, the first as an illuminant and the other as a fuel. In its capacity of fuel, gas is showing itself to be very economical, and the mode of its distribution makes it by far the most easily handled of all fuels.

The manufacture of coke, which is carried on in this country outside of ordinary city gas works upon an enormous scale, appears to be accompanied by a waste of good fuel that would be criminal were not the coal so cheap and abundant.

It is reported on good authority that in one Pennsylvania coke-making center not less than twenty-four million feet of good gas is daily thrown away into the air, and disappears in smoke that becomes a nuisance to all the country round about. To save this waste of fuel a new form of coke oven has been devised that enables the coke burner to make from the bi-products of his oven a good heating gas of about eight candle-power. It is useless for lighting, but for fuel it is invaluable, as it is clean, lights instantly, requires no stoking, and leaves no ash behind.

Experiments seem to show that the gas can be made or saved on a commercial scale, and may be sold for about ten cents a thousand feet. For a puddling furnace using the gas as a fuel, the cost would be about three dollars a day, for a battery of steam boilers about one dollar, and for an ordinary dwelling about ten cents a day. The use of gas fuel is steadily growing in this country; and if, as is claimed, it can be produced at this low price, it will prove of the greatest possible advantage in all cities, particularly in the West, where the smoke question is so troublesome. Gas is undoubtedly the fuel of the future, and it is only a matter of surprise that the gas companies do not make some effort to produce a cheap gas.

The rapid spreading of the electric light as an illuminant will, no doubt, compel the companies to look carefully into this matter.

The truth is that the gas people, owing to the long-continued hanging fire of the electric lighting project, have ceased to be frightened; and not even the great advances which are now being made, both in the introduction of the voltaic arc and incandescent systems, are not sufficient to wake them from the condition of lethargy in which they have permitted themselves to fall.

Unless they take care, the gas companies will find themselves forestalled in the business of selling gas as an illuminant, for already a number of wealthy persons have gone into the business in this city, and the predictions we made long since would seem about to be realized. The new gas fuel is used by tailors to heat their irons, by jewelers as a blow-pipe flame without the aid of any extra pressure—thus dispensing with the blow-pipe—and by tinsmiths for heating their soldering irons.

In the case of the tailor's goose and soldering iron, the gas is burned directly in the tools, and they may be used continuously without the delay of heating in a furnace. In the manufacture of hats the gas fuel is used to heat irons and embossing tools of all kinds, replacing charcoal fires and the use of illuminating gas.

The new fuel gas is clean and intensely hot, leaves no deposit of soot, and does not stain nor injure white fabrics. For domestic use, both in heating and cooking, the new fuel has been received with the utmost favor, and is now being introduced into a large number of dwellings. The price is about fifty cents per one thousand feet to small and from thirty to thirty-five to large consumers. At this rate, a range used in a restaurant for eighteen hours a day consumes about twenty cents worth of gas. A domestic stove for a small family will cost only a few cents' worth of gas. The gas fuel is now being applied to Smith's forges, and for tempering steel. For power, it is being used in gas engines, of which there are several descriptions, the "Otto" having thus far given by far the greatest satisfaction.

For turning electric dynamos these gas engines, or some of them, have been found to work admirably.

In Yonkers, N. Y., this cheap fuel gas is being manufactured on a large scale; and so successful have been the proprietors of the works that a company of capitalists are said to be now making arrangements to construct large works in this city for the purpose of supplying the upper part of the island with a cheap and clean fuel.

Convening the Inventors.

Many problems both political and social must yet be worked out before government for the people and by the people can be looked upon as in every way a success. Of course we cannot hope for perfection or complete happiness in this vale of tears; the wicked will no doubt always profit by the labor of others, and the deserving reap mortification where they have sown prosperity. But surely in a republic, if under no other form of government, the rights of the individual ought to be jealously guarded by the State: the harvest which comes from honest industry and perseverance should not be permitted to fall to the share of the drones and the unprincipled. Yet such is, to a certain extent, the case. Where the majority govern the rights of the few are likely to fall to the ground. Thus it happens that the inventors, being few in numbers, have never received in this country the protection to which they are justly entitled. Mechanisms which have cost years of arduous toil to perfect, have been snatched from their owners just as the current of popular favor had set toward them. Against this, it may be urged, that those thus injured have redress through the courts; but the law is slow, very slow as well as expensive, and men have been known, and not infrequently either, to go down to their graves with a good case while the courts were preparing to review the preliminary proceedings of their suit.

For these and similar reasons, a number of inventors recently determined to organize for their own protection. In furtherance of this laudable project they met last week in convention in Lyric Hall, this city.

In looking over the list of names we cannot help regretting that a more representative assemblage was not at hand, and that those who cannot be looked upon as inventors of anything more than new qualities of conceit, should have been permitted to take part in an otherwise reputable organization. The organizers of such movements should be ready to repress or rather to exclude the "crank." There is a species of "crank" wandering about who is as ready to join an inventors' association, as he or she is to take part in a political meeting, or a target excursion, or partake of a free lunch, and if care is not taken to exclude them they will cast a discredit upon the body to which they affix themselves, that the utmost exertions on the part of the managers will not suffice to eradicate.

We hope the organizers of the "Inventors Protective Association" will make it a success, but we must confess our opinion that the apparent status of some of those who took part in the proceedings, is not such as to attract representative inventors into the association.

The need of such an organization is both apparent and pressing, and it is somewhat singular that, though there are possibly over a hundred thousand inventors in this country, no organization of this kind banded together to protect their own interests has yet been formed.

The necessity for such an organization is, at this time, the more pressing because, as is well known, powerful influences are now being exerted, especially in the manufacturing districts of the West, against the present patent laws, which furnish at least a slight protection to the inventor. These influences may be said to oppose all property rights in patents. Those at present opposed to inventors' rights began their work in the Congress of 1875, up to which time they had defended their infringements in the courts. In that year they secured the passage through the House of Representatives of a bill which would have given them a great advantage over inventors and owners and manufacturers of inventions, if it had become a law. It failed to pass the Senate. In 1878, however, these persons showed themselves even more determined to take possession of the property of the inventors, and, says Secretary Forbes, in spite of the opposition of Senators Conkling, Davis and others, secured the passage of the Wadleigh bill, which virtually exempted railroads and similar corporations from all responsibility for infringements on patents, and placed restrictions on inventors which would have had the effect of killing many valuable patents and making them free to such of the combinations as desired to take advantage of them. This bill also passed the House, but, fortunately for the inventors, an amendment was made to it there which necessitated its return to the Senate, and the end of the session being now arrived, that body did not find time to act upon the changes made in the lower House. Another similar attempt will, no doubt, be made in the next Congress, and a well-organized body of reputable inventors would, there is reason to believe, be able to make a successful stand against its passage.

Secretary Forbes says: "Under the present liberal patent law, which was adopted in 1836, over 250,000 patents have been issued. During 1882 over 25,000 applications for new patents were filed. From 1790, when the first patent law was enacted in this country, up to the adoption of the law now in force, only 10,000 patents had been issued. For many years the New England States originated more inventions than any other part of the country of equal population, but New York has long stood at the head of the list, with Pennsylvania second. Since the war the applications from the Southern States have largely increased, principally for agricultural implements and cotton preparing machinery. The great increase in the manufacturing interests of the country and the improvements in the arts and sciences that have followed and been a result of the impetus given to patents by the present law, shows how much the material prosperity of the country depends on its inventive genius, and how great is the importance of protecting against the assaults of organized monopoly the law which has enabled that genius to assert itself. The Patent Office of the United States is the only branch of the Government which is run without any aid from the public funds. It is not only compelled to pay all of its own expenses, but all of the expenses of collecting, preparing, and distributing the statistics of the Agricultural Bureau. This is done with the fees paid by inventors, which have been so largely in excess of the expenses that a surplus of $2,000,000 has accumulated from them in the Treasury. The facilities allowed the Patent Office for the transaction of its business have for years been inadequate, and Congress has repeatedly been asked to authorize the use of the surplus fund for increasing the facilities, but has always refused to grant it. The working force of the office is so inefficient that there are to-day 3,000 applications behind in the work."

Toward the close of the meeting, Thomas L. Clingman entered the hall. He declared that he was not only in favor of protection for inventors on principle, but also on personal grounds, for that he had introduced an electric light both here and abroad, and had taken out patents on both sides of the ocean.

A telegram was then read coming from Mr. E. M. Marble, ex-Commissioner of Patents, at Washington, offering himself as permanent president of the association. The generous offer of Mr. Marble was, very properly, not accepted. This gave occasion for one king, who would seem to be a very objectionable person, and who had injudiciously

been permitted to take part in the proceedings, as an inventor, to exhibit both his ignorance and ill-breeding at one and the same time. He denounced Mr. Marble in unmeasured terms, though he as good as acknowledged that he knew the man he assailed neither personally nor by reputation. A few such immoderate persons as this king would seem to be, would be sufficient to wreck any ordinary organization, how good soever its aims might be.

Another Cable Laid Across the Narrows.

The laying of the third armored telegraph cable, by the Baltimore and Ohio Telegraph Company, was accomplished last Sunday in a highly successful manner, and all praise is accorded Superintendent Stewart of the line, Mr. J. C. Hankinson, superintendent of construction, and his assistant, Mr. J. McGathery, on the able manner in which the cable was handled, as everything worked as charmingly as could be wished.

The party, consisting of Mr. A. G. Day (the manufacturer) and Mrs. Day; Mr. C. W. Price, general manager of the New York office; Mr. J. H. Bunnell, 112 Liberty Street, and several other gentlemen, and a reporter from the *Herald* and *Times* and ELECTRICAL REVIEW, left by the Staten Island boat, at 10 o'clock, for Vanderbilt Landing, where the tugboat Sallie P. Linderman, Captain George Fouratt in command, towing a large scow with the cable on board, on a large reel ready to be payed out, arrived soon after, when the party left for Fort Hamilton, and arrangements were immediately made for anchoring the enormous wire by chains to a firm support, on the New Jersey shore.

Through the kindness of Superintendent Stewart and Manager Price all guests were invited to partake of a splendid luncheon, served on board the boat before starting for the other landing, at Fort Wadsworth. After a couple of hours' delay, owing to low water and the grounding of the tug, a start was ordered, and the paying out of the cable began. In thirty-four minutes the cable was landed on the opposite shore.

The cable is the largest ever manufactured, being of seven conductors made of three No. 18 Strinnighan wire-gauge copper wires, insulated with a heavy coating of kerite, each layer tapped and a very solid packing of jute wound over all, and the same armored with eighteen No. 3 galvanized-armor wires.

The cable measures 6,300 feet and weighs over twelve tons. The electricians and all united in saying that it was the finest piece of work ever done. The cable, after careful tests were made, was immediately made fast to the air-line conductors, and the word was given, "Ready for business." The party then re-embarked and started back to Fort Hamilton, and were handsomely entertained by Judge Charles S. Church to a very fine dinner, which all did justice to. Many regrets were expressed at the absence of Mr. Clark B. Hotchkiss, the general agent of Mr. Day, who is away West on business.

The excellent display of Electrical Apparatus at the American Institute Fair. A great increase over the exhibits of previous years.

SHERIDAN AND GORN'S ELECTRIC MOTORS. AN ADVANCE IN MOTORS.

One of the most interesting exhibits at the American Institute Fair held in the Societies building on Third avenue, New York City, is the Electric Motor in charge of Messrs. Sheridan & Gorn, for the Cleveland Electric Company, of Cleveland, Ohio. This motor is one of those little gems that will soon become a necessity in every household where a light and handy power will come like a benediction, and, as Mr. Sheridan says, "This motor can be stowed away in a band-box, and when in use it makes no smoke, no heat, no dirt, and there is a total absence of danger in its use."

This motor is unique in its simplicity, having scarcely any more machinery about it than there is in a grindstone, while the sizes range from about four to ten inches in diameter. A technical description of it was requested of Mr. Sheridan, but he thought the best way to do the subject justice was to wait about a week, when he will furnish the ELECTRICAL REVIEW with an electrotype and full description. Suffice it for the present to say that the motor is composed of a circular iron casting holding the magnets and insulated wire coil, while in the center is the revolving bar that is acted upon by the magnets, and carries the power.

"To what uses do you recommend your motors?" "For manufacturing and household purposes. This motor requires but little power for the amount of work it is capable of performing. Our greatest success has been in running sewing machines. Mr. S. E. Henderson, of Cleveland, Ohio, is president of the Leader Sewing Machine Company, and also president of this company that controls all the Sheridan patents. This arrangement has been exceedingly instrumental in developing the value of this motor for working sewing machines. With but little power, this motor has attained a momentum of 4,500 revolutions a minute, on twelve and a half volts for the sewing machine size, which is nine and a half inches high, nine inches wide, and twelve inches long. The same machine has developed power enough to run a wing exhaust fan thirty inches in diameter five hundred revolutions a minute."

For manufacturing purposes, or in cities and towns, these motors can be run by a dynamic current from central stations.

It is now working under a dynamic machine made under the Sheridan and the Sheridan & Gorn patent; and these same gentlemen have devices now before the patent commissioner for driving and regulating the motor, and governing its speed. The company proposes in cities to form central stations, giving over one wire a subdivided current from one-sixth to one horse power, and more when required."

To the question: What would be the cost of some of the attachments? Mr. Sheridan said, "The machine is so simple that one can put in the sewing machine motor with all attachments and the battery for twenty-five dollars, making it one of the cheapest motors in the market."

"To what other purposes have you put your motor?" "We have a battery to go with our motor that I am not yet prepared to describe, that of Doctor Hunter, who has the largest sized Holts, now in use, but prefers ours for its continuous current. Our battery runs ten hours a day continuously, at a cost of one and a half cent an hour. This we guarantee. By means of our motor we are now driving one hundred advertising signs in this Fair, with one of our smallest size and a two cell battery. With the same power we have run a sewing machine that has sewed through sixteen thicknesses of cotton cloth, such as blue overalls are made of. We are devising one of our motors to run a rowboat, placing the battery amidships, and it is only about eighteen inches square. We are running one with a fan attachment, for ventilating purposes, that delivers from 800 to 1,000 feet of air a minute."

Mr. Sheridan had on exhibition one of his motors prepared for use in dentistry, attached to a brass ribbon that extended or retreated at the operator's will, and that would seem to be a great improvement over the old tread power. He also expressed an intention to apply it to surgical instruments for sawing off limbs, cauterizing, and other kindred purposes. As he expressed it, there was practically no limit to the uses to which this little *multum in parvo* could be put. The motors are nickel plated and very attractive in appearance, and it is claimed that wherever light power is required this motor is superior to steam.

WILCOX AND SHIRMER ELECTRO-MEDICAL APPARATUS.

One of the most attractive exhibits of the fair is made by Drs. Wilcox and Shirmer. It consists of a beautiful and ingenious cabinet for electrical medical purposes. This cabinet is under the management of Mr. W. S. Sliter, the inventor, and it looks like a combined writing desk and book-case, and makes a very handsome and ornate piece of furniture. This ingenious machine is designed for producing the various electrical currents needed in medical treatment—a constant uninterrupted, a constant interrupted, a constant enFaradie and a Faradie current, as necessity may require. It is called the Sliter's Complete Cabinet, and is worked by a battery of sixty-four jars, made after a modification of the Sieman & Halske. Special electrodes go with it for medical purposes, and for various diseases. It is the only instrument that has yet been put on the market, Mr. Sliter says, that gives the four currents named above, and having these powers combined and always in working order, it is exceedingly convenient for surgeons and physicians to have in their offices as it is always ready for work without having to combine acids and metals to create the currents when needed, which delay may be of vital importance to the patient under treatment. It will cost to run it not exceeding $15 a year. As proof of the "pudding" the representative of the ELECTRICAL REVIEW subjected himself to the several currents named, and experienced all the sensations from the mild, constant warming current to the miniature kick of a mule, with a slight blistering process thrown in. Doctors Wilcox and Shirmer, with many other eminent physicians throughout the country, have employed Mr. Sliter to furnish them with this cabinet, and now have it in constant use, which is strong testimony in its favor. The advantage of having the power for generating these four currents in one instrument, and always in working order, is apparent at a glance, while all the working parts are under cover, lock and key, and out of harm's way.

THE APPLEGATE ELECTRIC MATTING, A PERFECT BURGLAR ALARM.

The New York Applegate Electric Matting Company show one of their designs for protection against burglars. The method of alarm is quite novel, and so secret that the most cautious burglar cannot avoid or detect it. The claims for it are: First, a perfect burglar alarm, always ready and always efficient; second, a prompt servant's call, which cannot be disregarded; and third, an instantaneous method of lighting gas whenever desired. To use their own words, the basis of the system consists of an invisible electric matting placed under the carpet rug, or other floor covering, and which when trod upon or touched by the foot, sounds instantly an alarm or signal in any desired portion of the building, or outside the same at any distance near or remote. This matting may be placed at the entrances of apartments, or near safes, wine closets, show cases, money drawers, &c., and they cannot be approached without sounding the alarm. If placed under a mat at the store door they will give notice of the approach of a customer.

The matting can also be made to light the gas as well as sound an alarm. By means of a switch the alarm can be disconnected during the day time, or when not needed, or, if put in a store, may send an alarm to the police, or to a gong on the outside of the building. They are applied without disfiguring furniture or walls, and can be changed at pleasure.

This matting is made of strips of poplar wood cut very thin and glued to muslin. Brass springs are attached on one side and fastened through with wire that is connected with the battery and bell, which are concealed in any part of the house. A felt covering is placed over the wires, so as to even it up and present a smooth surface to the carpet. After once starting the alarm, removing the foot does not stop the bell; tearing up the carpets, or cutting wires does not stop the bell or shut off the gas after it is once lighted.

Probably the most attractive feature of this invention, outside of its secrecy of application, is the manner in which it is put on the market. There is no offer to sell rights or mattings; but they are offered for hire at the reasonable figure of one dollar and fifty cents to three dollars a month, depending upon the amount required. This places them within the reach of the most economical, while no charge is made for putting in or other extras. The agent, with commendable pride, called attention to the list of references, which contains the names of such men as R. G. Ralston, president Farmers' Loan and Trust Company; G. R. Blanchard, vice-president N. Y., L. E. and W. R. R.; A. A. Low & Co.; State Safe Deposit Vaults; Wm. Murray, inspector of police; John Hoey, Adams Express Company, and many others of like good character. The list of officers of the company includes the names of many prominent citizens of New York, who have thus testified to their faith in the efficacy of this burglar alarm.

THE HILL BURGLAR ALARM.

Another very neat and ingenious contrivance for guarding against burglars is the Hill Burglar Alarm, which is also on exhibition at the Fair. It is intended to be fastened to the inside knob of the door, and can be applied at a moment's notice without marring the knob or defacing the door. It consists of a double-cup bell with a spring and hammer between them, and a ratchet and key for winding up. The trap that holds the alarm is hung to a pin so that, should the upright bar be displaced by turning the knob to either the right or the left, it slips off the catch and sounds the alarm. No subsequent motion of the knob can stop the alarm, as a spring prevents the upright bar from returning to its place. This machine is nicely nickel-plated, and costs $1.75. It is particularly recommended for travelers to carry with them and attach to the room doors of the hotels they stop at when they retire at night, though it could readily be applied to many other useful purposes that will suggest themselves to the reader.

THE GALVANO-FARADIC ELECTRO-MEDICAL APPARATUS.

The Galvano-Faradic Manufacturing Company had on exhibition several batteries for making Galvanic continuous currents and Faradic interrupted currents, and some combined instruments, all for medical purposes. The instruments were only to be seen through a glass case, and were without acid fillings and hence not in operation, but they will be so soon as the judges are ready to see them work in competition with other machines on exhibition. Mr. Theodore Ten Broeck, who had them in charge, thought they could be run at an expense of one dollar a month. The batteries were composed of bi-carbonate of potash, sulphuric acid, with zinc and carbon. These instruments present a very handsome appearance, and, being small, are convenient for physicians to leave with patients who need them constantly.

Trouble Over the Exposition Awards.

CINCINNATI.—On the 8th inst. Judge Maxwell, in the Court of Common Pleas, Hamilton County, granted an injunction restraining the commissioners of the exposition lately closed from issuing the awards for electric light systems and apparatus, as made by the committee appointed for that purpose, and ordering the commissioners from proceeding further in the matter until ordered so to do by the court. The complaint upon which this decision is based was brought by the United States Electric Light Company through their attorneys, and alleges unfairness in making the experiments and tests.

Improvement in Telegraphy.

The Standard Electric Manufacturing Company, of this city, has been organized for the introduction of a system of telegraphy by which one wire can be made to do the work of a dozen, or, if necessary, of seventy-two wires. The principle is one upon which many attempts have been made to accomplish the same result—the use of a toothed wheel which makes or breaks the current as its teeth sweep past the connecting stylus or brush, each tooth having a corresponding tooth in the receiving wheel which may be in another city. The wheel used by the new company contains seventy-two

teeth. Any one conversant with electrical matters will perceive that if the wheel in Boston, for instance, can be made to revolve in perfect synchronism with the New York wheel that there could be seventy-two messages going over one wire, for if each one of seventy-two receiving instruments could receive the current during the fraction of a second, during which the sending instrument passed over its particular cog, that would be sufficient for practical purposes, as the wheel revolves at the rate of 170 rotations a minute. If only one cog in the wheel were to send a click to Boston every time the connecting brush passed over it, and that click advanced a clock hand around a dial having letters instead of minute marks, it will be seen how a message could be sent. The dial-hand would move forward regularly—one letter for every turn of the wheel in New York until the desired letter was reached when a pause would indicate that that letter was to be written down. If two cogs in the sending wheel sent an electrical impulse through the wire, the dial hand would move forward twice as fast, but it has been found that one cog in a wheel rotating 170 times in a minute gives a speed sufficient for business purposes, and enough to enable as many messages to be sent every day as two business houses constantly in communication desire to exchange. The great trouble with this system has been heretofore that absolute synchronism has not been obtained. Two chronometers, even regulated by electricity do not move together with sufficient evenness, as the variation of the six-hundredth part of a second or more renders the machine useless. The new device consists in introducing a certain number of regulating cogs, which send a retarding current in case one machine runs faster than the other.

Where it is desirable to use the Morse sounder the wheel is divided into twelve parts of six cogs each, and one cog in each of these twelve divisions sends a pulsation to one of twelve machines at the other end of the line. The pulsations then come so close together that the sound resembles a continuous hum, and the Morse sounder can be used as a "make and break" instrument. When employed simply to move forward the dial hands of each of seventy-two instruments, the cost of renting such a convenience will be only a trifle of that charged by the telegraph companies for a private wire, besides which no trained operators are necessary to send and receive messages.

The American Rapid Telegraph Company has executed a mortgage involving the consolidated interests of the line in the States of New York, New Jersey, Ohio, Connecticut, Massachusetts, and Pennsylvania, and the city of Baltimore, upon its property and franchises to the Boston Safe Deposit and Trust Company for $3,000,000. Bonds of $1,000 each are given for the entire amount, payable on the 15th day of September, 1893, and coupons. The interest is at six per cent., to be paid semi-annually. Coupons calling for the payment of $30 on the 15th of March and the 15th day of September of each year are attached to each bond.

The American Rapid Telegraph Company will run new lines of ten wires from New York to Boston via Meriden. Some time this week 15 men will come from New York to set the poles, and will be followed next week by 40 linemen.—*Norwalk Hour.*

The Electric, Manufacturing, and Miscellaneous Stock Exchange has rented a suite of rooms in the Duncan Building, at Nassau and Pine Streets, and expects to begin business about Nov. 1. The projectors of this Exchange announce that it will be conducted on a very liberal plan.

We notice in the edition of October 23 of the *Patent Office Gazette* that Mr. C. G. Perkins, the quiet and effective worker in the field of electrical invention, comes out with some more patents of considerable value to those engaged in electric light interests. This young electrician may not have started as early as some inventors we know of in that field, but from present indications there is ground for believing that he will get to the front just as soon.

Articles incorporating the Electrical Construction and Supply Company were filed Monday in New York. The company is organized for the purpose of constructing and maintaining electric lighting, telegraph and telephone conductors and apparatus, with a capital stock of $120,000.

ALBANY.—In the Secretary of State's office the route of a new Postal Telegraph company with articles of incorporation were filed Saturday, October 20th. The main trunk line will run from New York through the southern tier of counties to Cleveland, O., Portland, Oregon, thence to San Francisco and New Mexico, having connection with all Pacific cities. There are three branch lines, one from Cincinnati to Savannah, touching all the Southern cities, while connections are to be made at Greenport, L. I., and Cape Cod, with submarine cables to Europe, and upon the Continent of Europe.

In the articles of incorporation every principal city is designated a direct connecting station with the American land-end office. One branch from Pittsburgh runs up through the oil regions and will connect with Buffalo. In the territory, the proposed new company covers a vast area. The capital stock is placed at the low figure of $1,500, divided into fifteen shares of $100 each, with privilege of increasing it. The corporators are Henry C. Gardner, Luther R. Marsh, T. K. Dupuy, Andw. W. Kent, and Dumont Clark.

G. W. Gates, for many years superintendent of the Vermont and New Hampshire district of the Western Union Telegraph Company, has resigned, to take effect on November 1. After that date the district will be under the direction of Superintendent Thomas Roche, of Boston. A part of the Connecticut district, which has heretofore been under Superintendent Roche's charge, has been transferred to Superintendent Hunstone, of the New York district.

INDIANAPOLIS.—Articles of association of the Bankers' and Merchants' Telegraph Company were filed October 18th. The capital stock is $200,000. The alleged object is to erect and operate telegraph lines between Terre Haute and New Castle, and elsewhere in Indiana.

The International and Northern Telegraph Company was organized in this city yesterday, with a capital stock of $5,000,000. The object is to run telegraph lines through the Northern and Eastern States and into Canada. The Directors for the first year are Joseph Owen, of Oswego; U. S. Gilbert, of Jefferson County; Christopher and Howard Meyer, of New York; Isaac Munson, of Watertown; Mahlon C. Martin, of New Brunswick; O. G. Staples, of Washington; John F. Walton, of St. Lawrence County; and John F. Moffett, of Watertown. The officers are: President, Mahlon C. Martin; Vice-President, Arren G. Staples; Secretary, Joseph Owen; Treasurer, John F. Moffett. The incorporators, besides those already mentioned as directors, are A. D. Remington, President of the Watertown Paper Company; A. W. Clark, ex-Consul at Valparaiso; C. W. Towne, attorney, of this city; William H. Kimball, President of the Canton, N. Y., Bank; Frederick T. Story, President of the Watertown Gas Company; Jas. T. Searles, banker, of Rome, N. Y.; E. R. Bulkley, President of the Syracuse Iron Company; W. H. Breeden, engaged in the rubber business in this city, and P. C. Onderdonk, a retired rubber manufacturer, of New Jersey. The Secretary, Mr. Owen, was formerly connected with the American Union Telegraph Company.

NEW HAVEN.—An electric light company, in which some of the wealthiest capitalists of the city are interested, was incorporated last week, under the name of the "New Haven Electric Light Company." The capital is $50,000, divided into 500 shares of $100 each, all of which has been subscribed. A large percentage of the capital has already been paid in. The stockholders are W. B. Hosmer, of Boston, who holds 290 shares; A. H Robertson, W. J. Atwater, James English, F. A. Gilbert and H. P. Frost of this city, each of whom hold $10 shares each. F. A. Gilbert has been elected President, and James English Secretary of the company. Several locations for the plant are under consideration, but none of them have been selected as yet. The Thompson-Houston system will be used. One hundred lamps will be put in at once, one-half of which have already been contracted for. It is not probable that the plant which belonged to the old New Haven company will be used. Two of the celebrated Armington & Sims high-speed engines have been bought, and are now on their way to this city.

It is about time for Cincinnati to quit calling herself the Paris of this country. Cincinnati, between her pork and her Teuton, stands out squarely as the Hamburg of America.—*Pittsburg Telegraph.*

BUSINESS NOTICES.

FOR SALE—United States and Canadian rights in an arc lamp; inventor desires to sell his patents outright for a moderate sum. Address "Arc Lamp," P. O. Box 3329, New York City.

A mechanical and electrical engineer, graduate of the United States Naval Academy, desires an engagement; highest testimonials. Address G. S., 25 Bowdoin street, Boston, Mass.

MUNICIPALITY OF BUENOS AYRES—PROPOSALS FOR PUBLIC LIGHTING.—Bids will be received up to December 15th, at the office of the Secretary of the Comptroller-General for electrically lighting the thoroughfares of the capital of the Argentine Republic.

Any or all the various systems will be taken under advisement.

The projector must give a public trial of his system—to take place on either the fifteenth day of January or February—in order to demonstrate its advantages.

The superficial area of the city is in the neighborhood of 4,540 pectares, square: the portion to be lighted is nearly the half of this area. All the streets are straight, of various dimensions, most, however, having a width of 9.46 metres, and the houses are, for the most part, about 10.32 metres in height. Some avenues are 25.80 metres in breadth; some streets vary from 12 to 13.76 metres in width.

The city is now lighted by 3,109 gas-burners and 2,000 oil lamps This gives a total of 5,109 lights.

The city must be lighted 1½ hour after sunset, and kept lighted until 1½ hour before sunrise

The intensity of the lights must be kept up during the hours of service, to the highest point the system is capable of attaining.

An estimate must be sent along with the bids, giving all necessary details of the system, number of persons which will be required to manage it, etc.

The bids will be opened in presence of the interested parties on Saturday, December 15, at 2 P. M.

The contract must be made for ten years, and the contractor must introduce into his system what improvements, from year to year, shall seem desirable.

The contractors must deposit in the National Bank, in the name of the Comptroller-General of the city, 10,000 piastres of the national currency of the Argentine Republic, as a guarantee of good faith.

The municipal corporation reserves to itself the right to accept the contract, which in its opinion shall seem to be the most desirable, or to reject any or all bids.

Address the Consulate of the Argentine Republic, or

M. MARIANO OBARRIO,
Secretary-General,
Buenos Ayres.

Telephone Stock Quotations.

American Bell Telephone Company	209
Bay State Telephone Company	123
Central New York Telephone and Telegraph Company	101
Boston and Northern Telephone Company	135
Empire State Telephone and Telegraph Company	203
Granite State Telephone Company	95
Hudson River Telephone and Telegraph Company	110
Long Island and New Jersey Telephone Company	100
Mexican Telephone Company	2½
National Bell Telephone Company of Maine	90
New York and Pennsylvania Telephone Company	100
Northwestern Telephone Company	100
Southwestern Telephone Company	68
Suburban Telephone Company	139
Southern Bell Telephone and Telegraph Company	125
Tropical Telephone Company	3
Central Union Telephone Company	100
Iowa Union " "	100
Missouri and Kansas Telephone Co.	90
United Telephone Company (Kansas and Missouri)	89
Bell Telephone Company, of Missouri	165
Wisconsin Telephone Company	125
Cumberland Telephone Company	100
Great Southern Telephone Company	100
Michigan Telephone Company	115
Chicago Telephone Company	290
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NEW PATENTS—ELECTRICAL—1883.

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING OCTOBER 23, 1883.

287,015 Time-controlling system; William F. Gardner, Baltimore, Md.
287,040 System of electric lighting; John A. McCoy, Fall River, Mass.
287,067 Electric arc lamp; John H. Tibbits, Hoosic, N. Y.
287,082 Mechanism for preventing induced currents in telephone lines; James W. Brennan and Nectar Rousseau, Chicago, Ill.
287,111 Telephone repeater; Daniel Drawbaugh, Eberly's Mill, Pa., assignor to the People's Telephone Company, New York, N. Y.
287,169 Sound transmitting apparatus; James H. Rogers, New York, N. Y., assignor to the American Electro-Gas Telephone Company of New Jersey.
287,170 Electric cane; Alfred Roovers and Alexander Roovers, New York, N. Y.
287,236 Metallic insulating covering for telegraph wires; Edward Clark, Cornwall, N. Y.
287,237 Gutter curbstone and sidewalk conduit for electric wires; Edward Clark, Cornwall, N. Y.
287,265 Printing telegraph and transmitter thereof; Stephen D. Field, New York, N. Y., assignor to the Commercial Telegram Company, same place.
287,266 Printing telegraph; Stephen D. Field, New York, N. Y., assignor to the Commercial Telegram Company, same place.
287,267 Electric transmitter; Stephen D. Field, New York, N. Y., assignor to the Commercial Telegram Company, same place.
287,288 Electric conductor; Frank Jacob, Woolwich, county of Kent, assignor to Siemens Brothers & Company (Limited), Westminster, England.
287,300 Electric switchboard and signaling apparatus; Thos. W. Lane, Boston, assignor to Chas. Williams, Jr., Somerville, Mass.
287,301 Telephone support; Thomas W. Lane, Boston, assignor to Charles Williams, Jr., Somerville, Mass.
287,313 Incandescent electric lamp and switch; Charles G. Perkins, Hoboken, N. J., assignor to the Imperial Electric Light Company, New York, N. Y.
287,314 Electric incandescent lamp and holder; Chas. G. Perkins, New York, N. Y., assignor to the Imperial Electric Light Company, same place.
287,315 Apparatus for carbonizing incandescents; Chas. G. Perkins, New York, N. Y., assignor to the Imperial Electric Light Company, same place.
287,316 Apparatus for carbonizing incandescents; Chas. G. Perkins, New York, N. Y., assignor to the Imperial Electric Light Company, same place.
287,317 Apparatus for treating incandescents; Chas. G. Perkins, New York, N. Y., assignor to the Imperial Electric Light Company, same place.
287,318 Apparatus for treating carbon filaments; Chas. G. Perkins, New York, N. Y., assignor to the Imperial Electric Light Company, same place.
287,319 Electric incandescent lamp; Chas. G. Perkins, New York, N. Y., assignor to the Imperial Electric Light Company, same place.
287,320 Automatic electric cut-out; Charles G. Perkins, New York, N. Y., assignor to the Imperial Electric Light Company, same place.
287,321 Automatic switch and cutout; Charles G. Perkins, New York, N. Y., assignor to the Imperial Electric Light Company, same place.
287,322 Electric switch and cutout; Charles G. Perkins, New York, N. Y., assignor to the Imperial Electric Light Company, same place.
287,323 Carbon-holder for incandescent lamps; Charles G. Perkins, New York, N. Y., assignor to the Imperial Electric Light Company, same place.
287,343 Regular for dynamo-electric machines; Charles J. Van Depoele, Chicago, Ill
287,344 Electrode for electric arc lamps; Charles J. Van Depoele, Chicago, Ill.
287,345 Safety switch for dynamo-electric machines; Charles J. Van Depoele, Chicago, Ill.
287,346 Insulating material; Charles J. Van Depoele, Chicago, Ill.
287,347 System of generating and distributing electric currents; Charles J. Van Depoele, Chicago, Ill.
287,356 Telephonic system; George Lee Anders, Boston, Mass., assignor to American Bell Telephone Company.
287,380 Electrical soldering iron; Chas. T. Hughes, Menlo Park, N. J.

The ELECTRICAL REVIEW for October 18th has an illustrated article on the Transmission of Electricity for Electric Railways, and contains besides valuable information to the electrician. Published in New York.—*Evening Standard, New Bedford, Mass.*

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The Howard Safety Appliance (Patented.)
This device comprises a lightning arrester, cut out, and fusible wire, in a compact form, to be placed outside of the house or place of business of the subscriber; the electric current, by means of an arm extending inside of the building, being entirely cut off from the interior at the will of the subscriber, while fusible wires afford additional protection when the instrument is in circuit should an excessive charge, as from electric light currents, be accidentally thrown upon the telephone line. The advantages of this device are too obvious to need further comment. It is in successful use in Providence and other exchanges, and is in increasing demand wherever it has been introduced.

The Breckenridge Jack (Patented.)
This is a device for looping in the Central Office telephone without breaking circuit, or in any way interfering with the free conversation of subscribers who may be using the line. The central telephone office in Providence has used this device in preference to all others. Two years' experience has proved its perfect reliability and adaptation to any of the wants, in this respect, of a large telephone exchange. It is in use in some fifteen or twenty exchanges in the country, and is recommended by all who are familiar with it.

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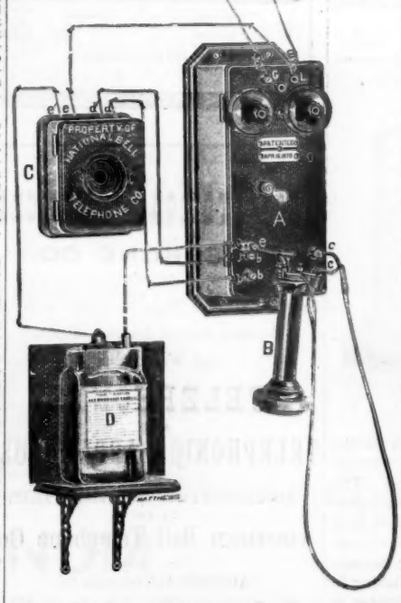

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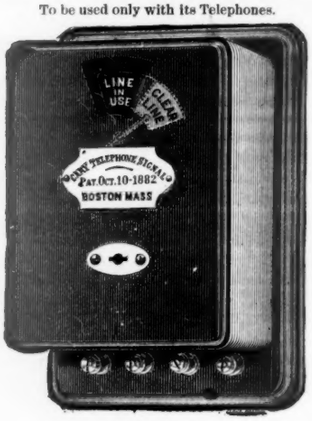

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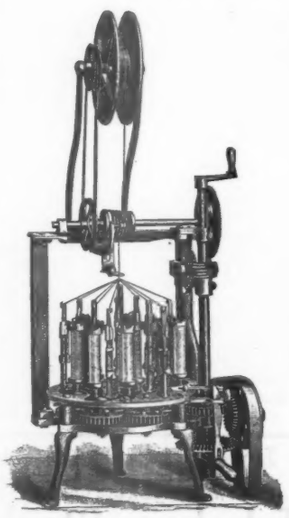

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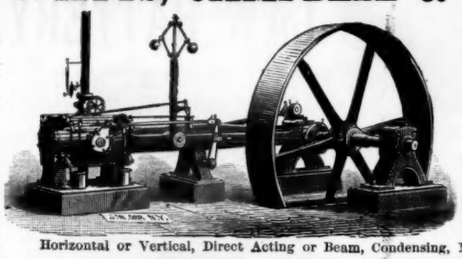

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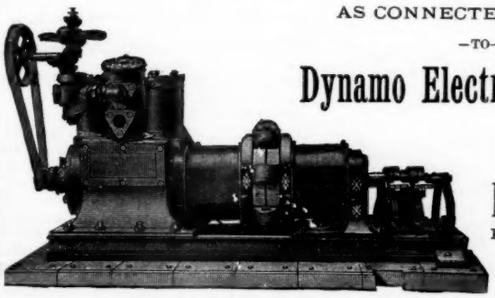

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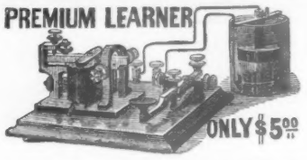

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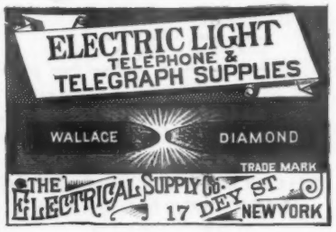

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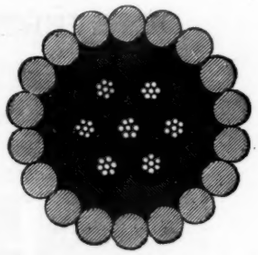

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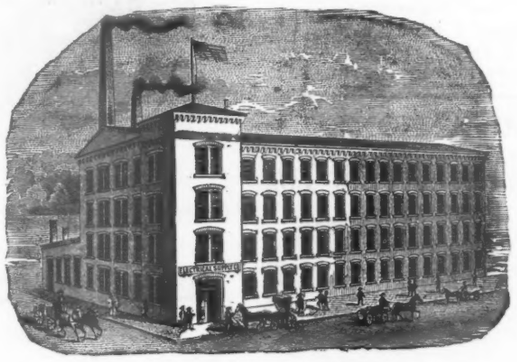

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